

A Correlation of



to the

# Cincinnati Pacing Guide

Grades K-5



G/M-215

## INTRODUCTION

This document demonstrates how well *Investigations in Number, Data, and Space*<sup>®</sup> integrates with the Cincinnati Pacing Guide. The citations within this correlation provide Investigation Curriculum Unit titles, followed by the Investigation and Session number or Focus Time/Choice Time title correlated to the benchmarks and indicators of the Cincinnati Pacing Guide.

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

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**Investigations in Number, Data, & Space  
Cincinnati Pacing Guide  
Kindergarten**

<b>Number Sense</b>	<b>Indicators</b>	<b>Investigations in Number, Data, &amp; Space</b>
<p>A. Use place value concepts to represent whole numbers using numerals, words and physical models.</p>	<p>5. Relate, read and write numerals for single-digit numbers (0 to 9).</p>	<p>Mathematical Thinking in Kindergarten Investigation 1: Focus Time: Attendance Investigation 2: Focus Time: Counting Jar Choice Time: Counting Jar Investigation 3: Focus Time: Calendar Collecting, Counting and Measuring Investigation 1-2, 4, 6 How Many in All? Investigation 1: Focus Time: Counting and Measuring Investigation 4: Focus Time: Five Crayons in All</p>
<p>B. Recognize, classify, compare and order whole numbers.</p>	<p>1. Compare and order whole numbers up to 10.</p>	<p>Mathematical Thinking in Kindergarten Investigation 1: Focus Time: Attendance Investigation 2: 4 Collecting, Counting and Measuring Investigation 1-2, 4, 6 Counting Ourselves and Others Investigation 1: Focus Time: How Many Are We? Focus Time: Counting Noses, Eyes How Many in All? Investigation 1: Focus Time: Counting and Measuring</p>

Number Sense	Indicators	Investigations in Number, Data, & Space
(continued)	7. Compare the number of objects in two or more sets when one set has one or two more, or one or two fewer objects.	Collecting, Counting and Measuring Investigation 3-6
	13. Recognize the number or quantity of sets up to 5 without counting; e.g., recognize without counting the dot arrangement on a domino as 5.	Mathematical Thinking in Kindergarten Investigation 1: Focus Time: Attendance Collecting, Counting and Measuring Investigation 1-2, 4, 6
C. Represent commonly used fractions using words and physical models.		Making Shapes and Building Blocks Investigation 4: Choice Time: Fill the Hexagons
D. Determine the value of a collection of coins and dollar bills.	9. Identify and state the value of a penny, nickel and dime.	Counting Ourselves and Others Investigation 3: Choice Time: The Grocery Store
E. Make change using coins for values up to one dollar.		Counting Ourselves and Others Investigation 3: Choice Time: The Grocery Store
F. Count, using numerals and ordinal numbers.	2. Explain rules of counting, such as each object should be counted once and that order does not change the number.	Mathematical Thinking in Kindergarten Investigation 1: Focus Time: Attendance Investigation 2-4 Collecting, Counting and Measuring Investigation 1-5 Counting Ourselves and Others Investigation 1 How Many in All? Investigation 1: Focus Time: Counting and Measuring Investigation 2

Number Sense	Indicators	Investigations in Number, Data, & Space
(continued)	3. Count to twenty; e.g., in play situations or while reading number books.	Mathematical Thinking in Kindergarten Investigation 1: Focus Time: Attendance Investigation 2-4 Collecting, Counting and Measuring Investigation 1-5 Counting Ourselves and Others Investigation 1 How Many in All? Investigation 1: Focus Time: Counting and Measuring Investigation 2
	4. Determine “how many” in sets (groups) of 10 or fewer objects.	Mathematical Thinking in Kindergarten Investigation 1: Focus Time: Attendance Investigation 2-4 Collecting, Counting and Measuring Investigation 1-5 Counting Ourselves and Others Investigation 1 How Many in All? Investigation 1: Focus Time: Counting and Measuring Investigation 2
G. Model, represent and explain addition as combining sets and counting on.	8. Represent and use whole numbers in flexible ways, including relating, composing and decomposing numbers; e.g., 5 marbles can be 2 red and 3 green or 1 red and 4 green.	Collecting, Counting and Measuring Investigation 6 How Many in All? Investigation 2, 4

Number Sense	Indicators	Investigations in Number, Data, & Space
(continued)	10. Model and represent addition as combining sets and counting on, and subtraction as take-away and comparison. For example:	How Many in All? Investigation 2-4
	a. Combine and separate small sets of objects in contextual situations; e.g., add or subtract one, two, or another small amount.	How Many in All? Investigation 2-4
	b. Count on (forward) and count back (backward) on a number line between 0 and 10.	How Many in All? Investigation 2-4
H. Model, represent and explain subtraction as comparison, take-away and part-to-whole.	8. Represent and use whole numbers in flexible ways, including relating, composing and decomposing numbers; e.g., 5 marbles can be 2 red and 3 green or 1 red and 4 green.	Collecting, Counting and Measuring Investigation 6 How Many in All? Investigation 2, 4
	10. Model and represent addition as combining sets and counting on, and subtraction as take-away and comparison. For example:	How Many in All? Investigation 2-4

Number Sense	Indicators	Investigations in Number, Data, & Space
(continued)	a. Combine and separate small sets of objects in contextual situations; e.g., add or subtract one, two, or another small amount.	How Many in All? Investigation 2-4
	b. Count on (forward) and count back (backward) on a number line between 0 and 10.	How Many in All? Investigation 2-4
I. Model, represent and explain multiplication as repeated addition, rectangular arrays and skip counting.	6. Construct multiple sets of objects each containing the same number of objects.	Counting Ourselves and Others Investigation 1: Choice Time: Pattern Block Grab
	1. Demonstrate joining multiple groups of objects, each containing the same number of objects; e.g., combining 3 bags of candy, each containing 2 pieces.	Counting Ourselves and Others Investigation 1: Choice Time: Pattern Block Grab
J. Model, represent and explain division as sharing equally, repeated subtraction and rectangular arrays.	12. Partition or share a small set of objects into groups of equal size; e.g., sharing 6 stickers equally among 3 children.	Can be developed from Making Shapes and Building Blocks Investigation 4: Choice Time: Fill the Hexagons
K. Demonstrate fluency in addition facts with addends through 9 and corresponding subtractions.	8. Represent and use whole numbers in flexible ways, including relating, composing and decomposing numbers; e.g., 5 marbles can be 2 red and 3 green or 1 red and 4 green.	Collecting, Counting and Measuring Investigation 6 How Many in All? Investigation 2-4



Number Sense	Indicators	Investigations in Number, Data, & Space
L. Demonstrate fluency in adding and subtracting multiples of 10, and recognize combinations that make 10.		Collecting, Counting and Measuring Investigation 6 How Many in All? Investigation 2-4
M. Add and subtract two-digit numbers with and without regrouping.		How Many in All? Investigation 2-4

Measurement Standard	Indicators	Investigations in Number, Data, & Space
A. Explain the need for standard units of measure.		Mathematical Thinking in Kindergarten Investigation 3: Focus Time: Calendar Collecting, Counting and Measuring Investigation 3 How Many in All? Investigation 1
B. Select appropriate units for length, weight, volume (capacity) and time, using: <ul style="list-style-type: none"> <li>• objects; i.e., non-standard units;</li> <li>• U.S. customary units: inch, foot, yard, ounce, pound, cup, quart, gallon, minute, hour, day, week and year;</li> <li>• metric units: centimeter, meter, gram and liter.</li> </ul>	1. Identify units of time (day, week, month, year) and compare calendar elements; e.g., weeks are longer than days.	Mathematical Thinking In Kindergarten Investigation 3: Focus Time: Calendar Collecting, Counting and Measuring Investigation 1: Focus Time: Extension: Time
	2. Compare and order objects of different lengths, areas, weights and capacities; and use relative terms, such as longer, shorter, bigger, smaller, heavier, lighter, more and less.	Collecting, Counting and Measuring Investigation 3 How Many in All? Investigation 1

Measurement Standard	Indicators	Investigations in Number, Data, & Space
C. Develop common referents for units of measure for length, weight, volume (capacity) and time to make comparisons and estimates.	1. Identify units of time (day, week, month, year) and compare calendar elements; e.g., weeks are longer than days.	Mathematical Thinking in Kindergarten Investigation 3: Focus Time: Calendar Collecting, Counting and Measuring Investigation 1: Focus Time: Extension: Time
	2. Compare and order objects of different lengths, areas, weights and capacities; and use relative terms, such as longer, shorter, bigger, smaller, heavier, lighter, more and less.	Collecting, Counting and Measuring Investigation 3 How Many in All? Investigation 1
	4. Order events based on time. For example:	Mathematical Thinking in Kindergarten Investigation 3: Focus Time: Calendar Collecting, Counting and Measuring Investigation 1: Focus Time: Extension: Time
	a. activities that take a long or short time;	Mathematical Thinking in Kindergarten Investigation 3: Focus Time: Calendar Collecting, Counting and Measuring Investigation 1: Focus Time: Extension: Time
	b. review what we do first, next, last;	Mathematical Thinking in Kindergarten Investigation 3: Focus Time: Calendar Collecting, Counting and Measuring Investigation 1: Focus Time: Extension: Time
	c. recall what we did or plan to do yesterday, today, tomorrow.	Mathematical Thinking in Kindergarten Investigation 3: Focus Time: Calendar Collecting, Counting and Measuring Investigation 1: Focus Time: Extension: Time

Measurement Standard	Indicators	Investigations in Number, Data, & Space
D. Apply measurement techniques to measure length, weight and volume (capacity).	3. Measure length and volume (capacity) using uniform objects in the environment. For example, find:	Collecting, Counting and Measuring Investigation 3 How Many in All? Investigation 1
	a. how many paper clips long is a pencil;	Collecting, Counting and Measuring Investigation 3 How Many in All? Investigation 1
	b. how many small containers it takes to fill one big container using sand, rice, beans.	Collecting, Counting and Measuring Investigation 3 How Many in All? Investigation 1
E. Recognize that using different units of measurement will yield different numbers for the same measurement.		Can be developed from Collecting, Counting and Measuring Investigation 3 How Many in All? Investigation 1

<b>Geometry and Spatial Sense</b>	<b>Indicators</b>	<b>Investigations in Number, Data, &amp; Space</b>
A. Describe and create plane figures: circle, rectangle, square, triangle, hexagon, trapezoid, parallelogram and rhombus, and identify them in the environment.		Making Shapes and Building Blocks Investigation 1, 2 Investigation 4: Focus Time: Clay Shapes Choice Time: Clay Shapes
B. Describe solid objects: cube, rectangular prism, sphere, cylinder, cone and pyramid, and identify them in the environment.		Making Shapes and Building Blocks Investigation 2, 3 Investigation 4: Choice Time: Build a Block Investigation 5
C. Sort and compare two-dimensional figures and three-dimensional objects according to their characteristics and properties.	1. Identify and sort two-dimensional shapes and three-dimensional objects. For example:	Making Shapes and Building Blocks Investigation 1-5
	a. Identify and describe two-dimensional figures and three-dimensional objects from the environment using the child's own vocabulary.	Making Shapes and Building Blocks Investigation 1, 3
	b. Sort shapes and objects into groups based on student-defined categories.	Making Shapes and Building Blocks Investigation 1, 3

<b>Geometry and Spatial Sense</b>	<b>Indicators</b>	<b>Investigations in Number, Data, &amp; Space</b>
(continued)	c. Select all shapes or objects of one type from a group.	Making Shapes and Building Blocks Investigation 1-5
	d. Build two-dimensional figures using paper shapes or tangrams; build simple three-dimensional objects using blocks.	Making Shapes and Building Blocks Investigation 4
D. Identify, explain and model (superposition, copying) the concept of shapes being congruent and similar.		Making Shapes and Building Blocks Investigation 1-5
E. Recognize two- and three-dimensional objects from different positions.		Making Shapes and Building Blocks Investigation 2, 5
F. Describe location, using comparative (before, after), directional (above, below), and positional (first, last) words.	2. Name and demonstrate the relative position of objects as follows:	Patterns, Trains and Hopscotch Patterns Investigation 4: Choice Time: Staircase Patterns Making Shapes and Building Blocks Investigation 2, 3, 5
	a. place objects over, under, inside, outside, on, beside, between, above, below, on top of, upside-down, behind, in back of, in front of;	Patterns, Trains and Hopscotch Patterns Investigation 4: Choice Time: Staircase Patterns Making Shapes and Building Blocks Investigation 2, 3, 5

<b>Geometry and Spatial Sense</b>	<b>Indicators</b>	<b>Investigations in Number, Data, &amp; Space</b>
(continued)	b. describe placement of objects with terms such as on, inside, outside, above, below, over, under, beside, between, in front of, behind.	Patterns, Trains and Hopscotch Patterns Investigation 4: Choice Time: Staircase Patterns Making Shapes and Building Blocks Investigation 2, 3, 5
G. Identify and draw figures with line symmetry.		Patterns, Trains and Hopscotch Patterns Investigation 4: Choice Time: Staircase Patterns Making Shapes and Building Blocks Investigation 2, 3, 5

Patterns, Functions and Algebra	Indicators	Investigations in Number, Data, & Space
A. Sort, classify, and order objects by size, number, and other properties, and describe the attributes used.	1. Sort, classify and order objects by size, number and other properties. For example:	Mathematical Thinking in Kindergarten Investigation 1: Choice Time Investigation 3: Choice Time Pattern Trains and Hopscotch Paths Investigation 1: Focus Time: Cubes, What Do You Notice? Counting Ourselves and Others Investigation 2-4
	a. Identify how objects are alike and different.	Mathematical Thinking in Kindergarten Investigation 1: Choice Time Investigation 3: Choice Time Pattern Trains and Hopscotch Paths Investigation 1: Focus Time: Cubes, What Do You Notice? Counting Ourselves and Others Investigation 2-4
	b. Order three events or objects according to a given attribute, such as time or size.	Mathematical Thinking in Kindergarten Investigation 3: Focus Time: Calendar Collecting, Counting and Measuring Investigation 3: Focus Time: Measurement Towers
	c. Recognize and explain how objects can be classified in more than one way.	Mathematical Thinking in Kindergarten Investigation 1: Choice Time Investigation 3: Choice Time Pattern Trains and Hopscotch Paths Investigation 1: Focus Time: Cubes, What Do You Notice? Counting Ourselves and Others Investigation 2-4



<b>Geometry and Spatial Sense</b>	<b>Indicators</b>	<b>Investigations in Number, Data, &amp; Space</b>
(continued)	d. Identify what attribute was used to sort groups of objects that have already been sorted.	Counting Ourselves and Others Investigation 2-4
B. Extend sequences of sounds and shapes or simple number patterns, and create and record similar patterns.	2. Identify, create, extend and copy sequences of sounds (such as musical notes), shapes (such as buttons, leaves or blocks), motions (such as hops or skips), and numbers from 1 to 10.	Pattern Trains and Hopscotch Paths Investigation 1-4
C. Create and extend patterns and describe the rule in words.	3. Describe orally the pattern of a given sequence.	Pattern Trains and Hopscotch Paths Investigation 1-4
D. Model problem situations using objects, pictures, tables, numbers, letters, and other symbols.	4. Model a problem situation using physical materials.	Mathematical Thinking in Kindergarten Investigation 1-4 Pattern Trains and Hopscotch Paths Investigation 1-4 Collecting, Counting and Measuring Investigation 1-6 Counting Ourselves and Others Investigation 1-4 Making Shapes and Building Blocks Investigation 1-5 How Many in All? Investigation 1-4

<b>Geometry and Spatial Sense</b>	<b>Indicators</b>	<b>Investigations in Number, Data, &amp; Space</b>
E. Solve open sentences and explain strategies.		Can be developed from How Many in All? Investigation 2, 3, 4
F. Represent an unknown quantity as a variable using a symbol, such as $\square$ ,		Can be developed from How Many in All? Investigation 2, 3, 4
G. Describe and compare qualitative and quantitative change.		Can be developed from Grade 1 Survey Questions and Secret Rules Investigation 4: Session 1-5

<b>Data Analysis &amp; Probability</b>	<b>Indicators</b>	<b>Investigations in Number, Data, &amp; Space</b>
A. Pose questions and gather data about everyday situations and familiar objects.	1. Gather and sort data in response to questions posed by teacher and students; e.g., how many sisters and brothers, what color shoes.	Mathematical Thinking in Kindergarten Investigation 1: Focus Time: Attendance Investigation 4 Counting Ourselves and Others Investigation 1-4
B. Sort and classify objects by attributes, and organize data into categories in a simple table or chart.	2. Arrange objects in a floor or table graph according to attributes, such as use, size, color, or shape.	Mathematical Thinking in Kindergarten Investigation 1: Focus Time: Attendance Investigation 2, 4 Counting Ourselves and Others Investigation 1-4
	3. Select the category or categories that have the most or fewest objects in a floor or table graph.	Mathematical Thinking in Kindergarten Investigation 1: Focus Time: Attendance Investigation 2, 4 Collecting, Counting and Measuring Investigation 2 Counting Ourselves and Others Investigation 1-4
C. Represent data using objects, picture graphs and bar graphs.		Mathematical Thinking in Kindergarten Investigation 1: Focus Time: Attendance Investigation 2, 4 Collecting, Counting and Measuring Investigation 2 Counting Ourselves and Others Investigation 1-4
D. Describe the probability of chance events as more, less or equally likely to occur.		Counting Ourselves and Others Investigation 3: Dialogue Box, 74-75

**Investigations in Number, Data, & Space  
Cincinnati Pacing Guide  
Grade One**

Number Sense	Indicators	Investigations in Number, Data, & Space
A. Use place value concepts to represent whole numbers using numerals, words and physical models.	5. Use place value concepts to represent whole numbers using numerals, words, expanded notation and physical models with ones and tens. For example:	Mathematical Thinking in Grade 1 Investigation 2: Session 1-6 Investigation 4: Session 1-6 Building Number Sense Investigation 1: Session 1-9 Investigation 2: Session 1-9 Number Games and Story Problems Investigation 1: Session 1-10 Investigation 2: Session 6-9
	a. Develop a system to group and count by twos, fives and tens.	Number Games and Story Problems Investigation 2: Session 1-12
	b. Identify patterns and groupings in a 100's chart and relate to place value concepts.	Building Number Sense Investigation 3: Session 1-2 Number Games and Story Problems Investigation 2: Session 6-8
	c. Recognize the first digit of a two-digit number as the most important to indicate size of a number and the nearness to 10 or 100.	Building Number Sense Investigation 3: Session 1-2 Number Games and Story Problems Investigation 2: Session 6-8

Number Sense	Indicators	Investigations in Number, Data, & Space
(continued)	3. Read and write the numerals for numbers to 100.	Mathematical Thinking at Grade 1 Investigation 2: Session 1-6 Investigation 4: Session 1-6 Building Number Sense Investigation 1: Session 1-9 Investigation 2: Session 1-9 Investigation 3: Sessions 1-2, 5-7 Number Games and Story Problems Investigation 1: Session 1-10 Investigation 2: Session 6-8
B. Recognize, classify, compare and order whole numbers.	1. Use ordinal numbers to order objects; e.g., first, second, third.	Building Number Sense Investigation 3: Sessions 5-7, 9 Number Games and Story Problems Investigation 2: Session 4-8
	2. Recognize and generate equivalent forms for the same number using physical models, words and number expressions; e.g., concept of ten is described by “10 blocks”, full tens frame, numeral 10, $5 + 5$ , $15 - 5$ , one less than 11, my brother’s age.	Mathematical Thinking at Grade 1 Investigation 2: Session 1-6 Investigation 4: Session 1-6 Building Number Sense Investigation 1: Session 1-9 Investigation 2: Session 1-9 Investigation 3: Sessions 1-2, 5-7 Number Games and Story Problems Investigation 1: Session 1-10

Number Sense	Indicators	Investigations in Number, Data, & Space
(continued)	4. Count forward to 100, count backwards from 100, and count forward or backward starting at any number between 1 and 100.	Mathematical Thinking at Grade 1 Investigation 2: Session 1-6 Investigation 4: Session 1-6 Building Number Sense Investigation 1: Session 1-9 Investigation 2: Session 1-9 Investigation 3: Sessions 1-2, 5-7 Number Games and Story Problems Investigation 1: Session 1-10 Investigation 2: Session 1-13
	15. Demonstrate that equal means “the same as” using visual representations.	Mathematical Thinking at Grade 1 Investigation 2: Session 4-6 Investigation 4: Session 4 Building Number Sense Investigation 2: Session 1-10 Number Games and Story Problems Investigation 1: Session 1-10
C. Represent commonly used fractions using words and physical models.	9. Represent commonly used fractions using words and physical models for halves, thirds and fourths, recognizing fractions are represented by equal size parts of a whole and of a set of objects.	Grade 2: Shapes, Halves and Symmetry Investigation 3: Session 1-8

Number Sense	Indicators	Investigations in Number, Data, & Space
D. Determine the value of a collection of coins and dollar bills.	6. Identify and state the value of a penny, nickel, dime, quarter and dollar.	Number Games and Story Problems Investigation 2: Session 3
	7. Determine the value of a small collection of coins (with a total value up to one dollar) using 1 or 2 different type coins, including pennies, nickels, dimes and quarters.	Number Games and Story Problems Investigation 2: Session 3
E. Make change using coins for values up to one dollar.	8. Show different combinations of coins that have the same value.	Number Games and Story Problems Investigation 2: Session 3
F. Count, using numerals and ordinal numbers.	4. Count forward to 100, count backwards from 100, and count forward or backward starting at any number between 1 and 100.	Mathematical Thinking at Grade 1 Investigation 2: Session 1-6 Investigation 4: Session 1-6 Building Number Sense Investigation 1: Session 1-9 Investigation 2: Session 1-9 Investigation 3: Session 1-2, 5-7 Number Games and Story Problems Investigation 1: Session 1-10 Investigation 2: Session 1-13

Number Sense	Indicators	Investigations in Number, Data, & Space
G. Model, represent and explain addition as combining sets and counting on.	10. Model, represent and explain addition as combining sets (part + part = whole) and counting on. For example:	Mathematical Thinking at Grade 1 Investigation 2: Session 4-6 Investigation 4: Sessions 2-4, 6 Building Number Sense Investigation 2: Session 1-9 Investigation 4: Sessions 1, 3-10 Number Games and Story Problems Investigation 1: Session 1-10 Investigation 2: Sessions 1-5, 10-13 Investigation 3: Sessions 1, 3-13
	a. Model and explain addition using physical materials in contextual situations.	Mathematical Thinking at Grade 1 Investigation 2: Session 4-6 Investigation 4: Sessions 2-4, 6 Building Number Sense Investigation 2: Session 1-9 Investigation 4: Sessions 1, 3-10 Number Games and Story Problems Investigation 1: Session 1-10 Investigation 2: Sessions 1-5, 10-13 Investigation 3: Sessions 1, 3-13
	b. Draw pictures to model addition.	Mathematical Thinking at Grade 1 Investigation 2: Session 4-6 Investigation 4: Sessions 2-4, 6 Building Number Sense Investigation 2: Session 1-9 Investigation 4: Sessions 1, 3-10 Number Games and Story Problems Investigation 1: Session 1-10 Investigation 2: Sessions 1-5, 10-13 Investigation 3: Sessions 1, 3-13



Number Sense	Indicators	Investigations in Number, Data, & Space
	c. Write number sentences to represent addition.	Building Number Sense Investigation 4: Sessions 1, 7-10 Number Games and Story Problems Investigation 1: Session 1-10 Investigation 2: Sessions 1-5, 10-13 Investigation 3: Sessions 1, 3-13
	d. Explain that adding two whole numbers yields a larger whole number.	Mathematical Thinking at Grade 1 Investigation 2: Session 4-6 Investigation 4: Sessions 2-4, 6 Building Number Sense Investigation 2: Session 1-9 Investigation 4: Sessions 1, 3-10 Number Games and Story Problems Investigation 1: Session 1-10 Investigation 2: Sessions 1-5, 10-13 Investigation 3: Sessions 1, 3-13
	12. Use conventional symbols to represent the operations of addition and subtraction.	Building Number Sense Investigation 4: Sessions 1, 7-10 Number Games and Story Problems Investigation 1: Session 1-10 Investigation 2: Sessions 1-5, 10-13 Investigation 3: Sessions 1, 3-13
H. Model, represent and explain subtraction as comparison, take-away and part-to-whole.	11. Model, represent and explain subtraction as take-away and comparison. For example:	Building Number Sense Investigation 4: Sessions 2-5, 7-10 Number Games and Story Problems Investigation 3: Sessions 2-8, 10-13

Number Sense	Indicators	Investigations in Number, Data, & Space
	a. Model and explain subtraction using physical materials in contextual situations.	Building Number Sense Investigation 4: Sessions 2-5, 7-10 Number Games and Story Problems Investigation 3: Sessions 2-8, 10-13
	b. Draw pictures to model subtraction.	Building Number Sense Investigation 4: Sessions 2-5, 7-10 Number Games and Story Problems Investigation 3: Sessions 2-8, 10-13
	c. Write number sentences to represent subtraction.	Building Number Sense Investigation 4: Sessions 2-5, 7-10 Number Games and Story Problems Investigation 3: Sessions 2-8, 10-13
	d. Explain that subtraction of whole numbers yields an answer smaller than the original number.	Building Number Sense Investigation 4: Sessions 2-5, 7-10 Number Games and Story Problems Investigation 3: Sessions 2-8, 10-13
	12. Use conventional symbols to represent the operations of addition and subtraction.	Building Number Sense Investigation 4: Sessions 2-5, 7-10 Number Games and Story Problems Investigation 3: Sessions 2-8, 10-13
I. Model, represent and explain multiplication as repeated addition, rectangular arrays and skip counting.	13. Model and represent multiplication as repeated addition and rectangular arrays in contextual situations; e.g., four people will be at my party and if I want to give 3 balloons to each person, how many balloons will I need to buy?	Can be developed from Number Games and Story Problems Investigation 1: Session 1-3 Investigation 2: Sessions 1-2, 4-8, 10-12

Number Sense	Indicators	Investigations in Number, Data, & Space
J. Model, represent and explain division as sharing equally, repeated subtraction and rectangular arrays.	14. Model and represent division as sharing equally in contextual situations; e.g., sharing cookies.	Can be developed from Number Games and Story Problems Investigation 1: Session 1-3
K. Demonstrate fluency in addition facts with addends through 9 and corresponding subtractions.	16. Develop strategies for basic addition facts, such as:	Mathematical Thinking at Grade 1 Investigation 2: Session 4-6 Investigation 4: Session 4 Building Number Sense Investigation 2: Sessions 1-2, 4-9
	a. counting all;	Mathematical Thinking at Grade 1 Investigation 2: Session 4-6 Investigation 4: Session 4 Building Number Sense Investigation 2: Sessions 1-2, 4-9
	b. counting on;	Mathematical Thinking at Grade 1 Investigation 2: Session 4-6 Investigation 4: Session 4 Building Number Sense Investigation 2: Sessions 1-2, 4-9
	c. one more, two more;	Mathematical Thinking at Grade 1 Investigation 2: Session 4-6 Investigation 4: Session 4 Building Number Sense Investigation 2: Sessions 1-2, 4-9

Number Sense	Indicators	Investigations in Number, Data, & Space
	d. doubles;	Mathematical Thinking at Grade 1 Investigation 2: Session 4-6 Investigation 4: Session 4 Building Number Sense Investigation 2: Sessions 1-2, 4-9
	e. doubles plus or minus one;	Mathematical Thinking at Grade 1 Investigation 2: Session 465 Investigation 4: Session 4 Building Number Sense Investigation 2: Sessions 1-2, 4-9
	f. make ten;	Mathematical Thinking at Grade 1 Investigation 2: Session 4-6 Investigation 4: Session 4 Building Number Sense Investigation 2: Sessions 1-2, 4-9
	g. using tens frames;	Mathematical Thinking at Grade 1 Investigation 2: Session 4-6 Investigation 4: Session 4 Building Number Sense Investigation 2: Sessions 1-2, 4-9
	h. identity property (adding zero).	Mathematical Thinking at Grade 1 Investigation 2: Session 4-6 Investigation 4: Session 4 Building Number Sense Investigation 2: Sessions 1-2, 4-9

Number Sense	Indicators	Investigations in Number, Data, & Space
	17. Develop strategies for basic subtraction facts, such as:	Can be developed from Mathematical Thinking at Grade 1 Investigation 2: Session 4-6 Investigation 4: Session 4 Building Number Sense Investigation 2: Sessions 1-2, 4-9
	a. relating to addition (for example, think of $7 - 3 = ?$ as "3 plus ? equals 7");	Can be developed from Mathematical Thinking at Grade 1 Investigation 2: Session 4-6 Investigation 4: Session 4 Building Number Sense Investigation 2: Sessions 1-2, 4-9
	b. one less, two less;	Can be developed from Mathematical Thinking at Grade 1 Investigation 2: Session 4-6 Investigation 4: Session 4 Building Number Sense Investigation 2: Sessions 1-2, 4-9
	c. all but one (for example, $8 - 7$ , $5 - 4$ );	Can be developed from Mathematical Thinking at Grade 1 Investigation 2: Session 4-6 Investigation 4: Session 4 Building Number Sense Investigation 2: Sessions 1-2, 4-9

Number Sense	Indicators	Investigations in Number, Data, & Space
	d. using tens frames;	Can be developed from Mathematical Thinking at Grade 1 Investigation 2: Session 4-6 Investigation 4: Session 4 Building Number Sense Investigation 2: Sessions 1-2, 4-9
	e. missing addends.	Can be developed from Mathematical Thinking at Grade 1 Investigation 2: Session 4-6 Investigation 4: Session 4 Building Number Sense Investigation 2: Sessions 1-2, 4-9
	16. Develop strategies for basic addition facts, such as:	Mathematical Thinking at Grade 1 Investigation 2: Session 4-6 Investigation 4: Session 4 Building Number Sense Investigation 2: Sessions 1-2, 4-9
	a. counting all;	Mathematical Thinking at Grade 1 Investigation 2: Session 4-6 Investigation 4: Session 4 Building Number Sense Investigation 2: Sessions 1-2, 4-9
	b. counting on;	Mathematical Thinking at Grade 1 Investigation 2: Session 4-6 Investigation 4: Session 4 Building Number Sense Investigation 2: Sessions 1-2, 4-9

Number Sense	Indicators	Investigations in Number, Data, & Space
	c. one more, two more;	Mathematical Thinking at Grade 1 Investigation 2: Session 4-6 Investigation 4: Session 4 Building Number Sense Investigation 2: Sessions 1-2, 4-9
	d. doubles;	Mathematical Thinking at Grade 1 Investigation 2: Session 4-6 Investigation 4: Session 4 Building Number Sense Investigation 2: Sessions 1-2, 4-9
	e. doubles plus or minus one;	Mathematical Thinking at Grade 1 Investigation 2: Session 4-6 Investigation 4: Session 4 Building Number Sense Investigation 2: Sessions 1-2, 4-9
	f. make ten;	Mathematical Thinking at Grade 1 Investigation 2: Session 4-6 Investigation 4: Session 4 Building Number Sense Investigation 2: Sessions 1-2, 4-9
	g. using tens frames;	Mathematical Thinking at Grade 1 Investigation 2: Session 4-6 Investigation 4: Session 4 Building Number Sense Investigation 2: Sessions 1-2, 4-9

Number Sense	Indicators	Investigations in Number, Data, & Space
	h. identity property (adding zero).	Mathematical Thinking at Grade 1 Investigation 2: Session 4-6 Investigation 4: Session 4 Building Number Sense Investigation 2: Sessions 1-2, 4-9
	17. Develop strategies for basic subtraction facts, such as:	Can be developed from Mathematical Thinking at Grade 1 Investigation 2: Session 4-6 Investigation 4: Session 4 Building Number Sense Investigation 2: Sessions 1-2, 4-9
	a. relating to addition (for example, think of $7 - 3 = ?$ as "3 plus ? equals 7");	Can be developed from Mathematical Thinking at Grade 1 Investigation 2: Session 4-6 Investigation 4: Session 4 Building Number Sense Investigation 2: Sessions 1-2, 4-9
	b. one less, two less;	Can be developed from Mathematical Thinking at Grade 1 Investigation 2: Session 4-6 Investigation 4: Session 4 Building Number Sense Investigation 2: Sessions 1-2, 4-9



Number Sense	Indicators	Investigations in Number, Data, & Space
	c. all but one (for example, 8 - 7, 5 - 4);	Can be developed from Mathematical Thinking at Grade 1 Investigation 2: Session 4-6 Investigation 4: Session 4 Building Number Sense Investigation 2: Sessions 1-2, 4-9
	d. using tens frames;	Can be developed from Mathematical Thinking at Grade 1 Investigation 2: Session 4-6 Investigation 4: Session 4 Building Number Sense Investigation 2: Sessions 1-2, 4-9
	e. missing addends.	Can be developed from Mathematical Thinking at Grade 1 Investigation 2: Session 4-6 Investigation 4: Session 4 Building Number Sense Investigation 2: Sessions 1-2, 4-9
L. Demonstrate fluency in adding and subtracting multiples of 10, and recognize combinations that make 10.	16. Develop strategies for basic addition facts, such as:	Building Number Sense Investigation 2: Session 2 Investigation 3: Sessions 1-2, 5-7 Number Games and Story Problems Investigation 2: Session 6-12
	a. counting all;	Building Number Sense Investigation 2: Session 2 Investigation 3: Sessions 1-2, 5-7 Number Games and Story Problems Investigation 2: Session 6-12

Number Sense	Indicators	Investigations in Number, Data, & Space
(continued)	b. counting on;	Building Number Sense Investigation 2: Session 2 Investigation 3: Sessions 1-2, 5-7 Number Games and Story Problems Investigation 2: Session 6-12
	c. one more, two more;	Building Number Sense Investigation 2: Session 2 Investigation 3: Sessions 1-2, 5-7 Number Games and Story Problems Investigation 2: Session 6-12
	d. doubles;	Building Number Sense Investigation 2: Session 2 Investigation 3: Sessions 1-2, 5-7 Number Games and Story Problems Investigation 2: Session 6-12
	e. doubles plus or minus one;	Building Number Sense Investigation 2: Session 2 Investigation 3: Sessions 1-2, 5-7 Number Games and Story Problems Investigation 2: Session 6-12
	f. make ten;	Building Number Sense Investigation 2: Session 2 Investigation 3: Sessions 1-2, 5-7 Number Games and Story Problems Investigation 2: Session 6-12

Number Sense	Indicators	Investigations in Number, Data, & Space
(continued)	g. using tens frames;	Building Number Sense Investigation 2: Session 2 Investigation 3: Sessions 1-2, 5-7 Number Games and Story Problems Investigation 2: Session 6-12
	17. Develop strategies for basic subtraction facts, such as:	Can be developed from Building Number Sense Investigation 2: Session 2 Investigation 3: Sessions 1-2, 5-7 Number Games and Story Problems Investigation 2: Session 6-12
	a. relating to addition (for example, think of $7 - 3 = ?$ as "3 plus ? equals 7");	Can be developed from Building Number Sense Investigation 2: Session 2 Investigation 3: Sessions 1-2, 5-7 Number Games and Story Problems Investigation 2: Session 6-12
	b. one less, two less;	Can be developed from Building Number Sense Investigation 2: Session 2 Investigation 3: Sessions 1-2, 5-7 Number Games and Story Problems Investigation 2: Session 6-12
	c. all but one (for example, $8 - 7$ , $5 - 4$ );	Can be developed from Building Number Sense Investigation 2: Session 2 Investigation 3: Sessions 1-2, 5-7 Number Games and Story Problems Investigation 2: Session 6-12

Number Sense	Indicators	Investigations in Number, Data, & Space
(continued)	d. using tens frames;	Can be developed from Building Number Sense Investigation 2: Session 2 Investigation 3: Sessions 1-2, 5-7 Number Games and Story Problems Investigation 2: Session 6-12
	e. missing addends.	Can be developed from Building Number Sense Investigation 2: Session 2 Investigation 3: Sessions 1-2, 5-7 Number Games and Story Problems Investigation 2: Session 6-12
M. Add and subtract two-digit numbers with and without regrouping.		Can be developed from Building Number Sense Investigation 4: Session 1-10 Number Games and Story Problems Investigation 3: Session 1-13

<b>Measurement Standard</b>	<b>Indicators</b>	<b>Investigations in Number, Data, &amp; Space</b>
A. Explain the need for standard units of measure.	1. Recognize and explain the need for fixed units and tools for measuring length and weight; i.e., rulers and balance scales.	Bigger, Taller, Heavier, Smaller Investigation 1: Session 1-6 Investigation 3: Session 1-5
B. Select appropriate units for length, weight, volume (capacity) and time, using:		Bigger, Taller, Heavier, Smaller Investigation 1: Session 1-6 Investigation 2: Session 1-7 Investigation 3: Session 1-5
<ul style="list-style-type: none"> <li>objects; i.e., non-standard units;</li> </ul>		Bigger, Taller, Heavier, Smaller Investigation 1: Session 1-6 Investigation 2: Session 1-7 Investigation 3: Session 1-5
<ul style="list-style-type: none"> <li>U.S. customary units: inch, foot, yard, ounce, pound, cup, quart, gallon, minute, hour, day, week and year;</li> </ul>		Bigger, Taller, Heavier, Smaller Investigation 1: Session 1-6 Investigation 2: Session 1-7 Investigation 3: Session 1-5
<ul style="list-style-type: none"> <li>metric units: centimeter, meter, gram and liter.</li> </ul>		Can be developed from Bigger, Taller, Heavier, Smaller Investigation 1: Session 1-6 Investigation 2: Session 1-7 Investigation 3: Session 1-5
C. Develop common referents for units of measure for length, weight, volume (capacity) and time to make comparisons and estimates.	2. Tell time to the hour and half hour on digital and analog (dial) timepieces.	In an appendix at the end of each text is Classroom Routines, Time and Change, consisting of activities in which students explore units of time, relationships among them, daily schedules and weather.

<b>Measurement Standard</b>	<b>Indicators</b>	<b>Investigations in Number, Data, &amp; Space</b>
(continued)	3. Order a sequence of events with respect to time; e.g., summer, fall, winter and spring; morning, afternoon and night.	Survey Questions and Secret Rules Investigation 3: Session 1-3
D. Apply measurement techniques to measure length, weight and volume (capacity).	4. Estimate and measure weight using non-standard units; e.g., blocks of uniform size.	Bigger, Taller, Heavier, Smaller Investigation 1: Session 1-6
	5. Estimate and measure lengths using non-standard and standard units; i.e., centimeters, inches and feet.	Bigger, Taller, Heavier, Smaller Investigation 3: Session 1-5
E. Recognize that using different units of measurement will yield different numbers for the same measurement.		Bigger, Taller, Heavier, Smaller Investigation 1: Session 1-6 Investigation 2: Session 1-7 Investigation 3: Session 1-5

<b>Geometry and Spatial Sense</b>	<b>Indicators</b>	<b>Investigations in Number, Data, &amp; Space</b>
A. Describe and create plane figures: circle, rectangle, square, triangle, hexagon, trapezoid, parallelogram and rhombus, and identify them in the environment.	2. Create new shapes by combining or cutting apart existing shapes.	Quilt Squares and Block Towns Investigation 1: Session 2-10
	3. Identify the shapes of the faces of three-dimensional objects.	Quilt Squares and Block Towns Investigation 1: Session 1-12
B. Describe solid objects: cube, rectangular prism, sphere, cylinder, cone and pyramid, and identify them in the environment.	3. Identify the shapes of the faces of three-dimensional objects.	Quilt Squares and Block Towns Investigation 2: Session 1-10 Investigation 3: Session 1-5
C. Sort and compare two-dimensional figures and three-dimensional objects according to their characteristics and properties.	1. Identify, compare, and sort two-dimensional shapes; i.e., square, circle, ellipse, triangle, rectangle, rhombus, trapezoid, parallelogram, pentagon, and hexagon. For example:	Survey Questions and Secret Rules Investigation 1: Session 1-2 Quilt Squares and Block Towns Investigation 1: Session 11-12
	a. Recognize and identify triangles and rhombuses independent of position, shape or size;	Survey Questions and Secret Rules Investigation 1: Session 1-2 Quilt Squares and Block Towns Investigation 1: Sessions 1, 2, 3-6, 11-12
	b. Describe two-dimensional shapes using attributes such as number of sides and number of vertices (corners, or angles).	Survey Questions and Secret Rules Investigation 1: Session 1-2 Quilt Squares and Block Towns Investigation 1: Sessions 1, 2, 3-6, 11-12

<b>Geometry and Spatial Sense</b>	<b>Indicators</b>	<b>Investigations in Number, Data, &amp; Space</b>
D. Identify, explain and model (superposition, copying) the concept of shapes being congruent and similar.	5. Copy figures and draw simple two-dimensional shapes from memory.	Survey Questions and Secret Rules Investigation 1: Session 1-2 Quilt Squares and Block Towns Investigation 1: Session 1-15
E. Recognize two- and three-dimensional objects from different positions.	5. Copy figures and draw simple two-dimensional shapes from memory.	Survey Questions and Secret Rules Investigation 1: Session 1-2 Quilt Squares and Block Towns Investigation 1: Session 1-15
F. Describe location, using comparative (before, after), directional (above, below), and positional (first, last) words.	4. Extend the use of location words to include distance (near, far, close to) and directional words (left, right).	Quilt Squares and Block Towns Investigation 3: Session 6-7
G. Identify and draw figures with line symmetry.	5. Copy figures and draw simple two-dimensional shapes from memory.	Quilt Squares and Block Towns Investigation 1: Sessions 1, 13-15



Patterns, Functions and Algebra	Indicators	Investigations in Number, Data, & Space
A. Sort, classify, and order objects by size, number, and other properties, and describe the attributes used.	1. Sort, classify and order objects by two or more attributes, such as color and shape, and explain how objects were sorted.	Mathematical Thinking at Grade 1 Investigation 5: Session 3-6 Survey Questions and Secret Rules Investigation 1: Session 1-6 Investigation 2: Session 3-4 Quilt Squares and Block Towns Investigation 1: Session 11-12 Investigation 2: Session 1-3
B. Extend sequences of sounds and shapes or simple number patterns, and create and record similar patterns.	2. Extend sequences of sounds, shapes or simple number patterns, and create and record similar patterns. For example:	Mathematical Thinking at Grade 1 Investigation 3: Session 1-6 Investigation 4: Sessions 2-3, 5 Building Number Sense Investigation 3: Session 1-8 Investigation 4: Session 10 Number Games and Story Problems Investigation 2: Session 6-9
	a. Analyze and describe patterns with multiple attributes using numbers and shapes; e.g., AA, B, aa, b, AA, B, aa, b,...	Mathematical Thinking at Grade 1 Investigation 3: Session 1-6 Investigation 4: Sessions 2-3, 5 Building Number Sense Investigation 3: Session 1-8 Investigation 4: Session 10 Number Games and Story Problems Investigation 2: Session 6-9

Patterns, Functions and Algebra	Indicators	Investigations in Number, Data, & Space
(continued)	b. Continue repeating and growing patterns with materials, pictures and geometric items; e.g., XO, XOO, XOOO, XOOOO.	Mathematical Thinking at Grade 1 Investigation 3: Session 1-6 Investigation 4: Sessions 2-3, 5 Building Number Sense Investigation 3: Session 1-8 Investigation 4: Session 10 Number Games and Story Problems Investigation 2: Session 6-9
C. Create and extend patterns and describe the rule in words.	3. Describe orally the basic unit or general plan of a repeating or growing pattern.	Mathematical Thinking at Grade 1 Investigation 3: Session 1-6 Investigation 4: Sessions 2-3, 5 Building Number Sense Investigation 3: Session 1-8 Investigation 4: Session 10 Number Games and Story Problems Investigation 2: Session 6-9
D. Model problem situations using objects, pictures, tables, numbers, letters, and other symbols.	5. Describe orally and model a problem situation using words, objects or number phrase or sentence.	Representative Pages: Mathematical Thinking at Grade 1 Investigation 2: Session 1-6 Building Number Sense Investigation 4: Session 1-10 Survey Questions and Secret Rules Investigation 2: Session 1-6 Quilt Squares and Block Towns Investigation 2: Session 1-10 Number Games and Story Problems Investigation 3: Session 1-13

Patterns, Functions and Algebra	Indicators	Investigations in Number, Data, & Space
E. Solve open sentences and explain strategies.	4. Solve open sentences by representing an expression in more than one way using the commutative property; e.g., $4 + 5 = 5 + 4$ or the number of blue balls plus red balls is the same as the number of red balls plus blue balls ( $R+B=B+R$ ).	Mathematical Thinking at Grade 1 Investigation 2: Session 4-6 Investigation 4: Sessions 2-4 Building Number Sense Investigation 2: Sessions 1-2, 4-9 Number Games and Story Problems Investigation 3: Session 9
F. Represent an unknown quantity as a variable using a symbol, such as $\square$ ,		Mathematical Thinking at Grade 1 Investigation 2: Session 4-6 Investigation 4: Sessions 2-4 Building Number Sense Investigation 2: Sessions 1-2, 4-9 Number Games and Story Problems Investigation 3: Session 9
G. Describe and compare qualitative and quantitative change.		Survey Questions and Secret Rules Investigation 4: Session 1-5

<b>Data Analysis &amp; Probability</b>	<b>Indicators</b>	<b>Investigations in Number, Data, &amp; Space</b>
A. Pose questions and gather data about everyday situations and familiar objects.	5. Construct a question that can be answered by using information from a graph.	Mathematical Thinking at Grade 1 Investigation 5: Session 1-6 Survey Questions and Secret Rules Investigation 2: Session 1-6 Investigation 3: Session 1-3 Investigation 4: Session 1-5
B. Sort and classify objects by attributes, and organize data into categories in a simple table or chart.	1. Identify multiple categories for sorting data.	Mathematical Thinking at Grade 1 Investigation 5: Session 1-6 Survey Questions and Secret Rules Investigation 2: Session 1-6 Investigation 3: Session 1-3 Investigation 4: Session 1-5
	2. Collect and organize data into charts using tally marks.	Mathematical Thinking at Grade 1 Investigation 5: Session 1-6 Survey Questions and Secret Rules Investigation 2: Session 1-6 Investigation 3: Session 1-3 Investigation 4: Session 1-5
	6. Arrange five objects by an attribute, such as size or weight, and identify the ordinal position of each object.	Bigger, Taller, Heavier, Smaller Investigation 1: Session 3-4 Investigation 2: Session 5-7 Investigation 3: Session 1

Patterns, Functions and Algebra	Indicators	Investigations in Number, Data, & Space
(continued)	7. Answer questions about the number of objects represented in a picture graph, bar graph or table graph; e.g., category with most, how many more in a category compared to another, how many altogether in two categories.	Mathematical Thinking at Grade 1 Investigation 5: Session 1-6 Survey Questions and Secret Rules Investigation 2: Session 1-6 Investigation 3: Session 1-3 Investigation 4: Session 1-5
C. Represent data using objects, picture graphs and bar graphs.	3. Display data in picture graphs with units of 1 and bar graphs with intervals of 1.	Mathematical Thinking at Grade 1 Investigation 5: Session 3-6 Survey Questions and Secret Rules Investigation 2: Session 5-6 Investigation 3: Session 1-3 Investigation 4: Session 1-5
	4. Read and interpret charts, picture graphs and bar graphs as sources of information to identify main ideas, draw conclusions, and make predictions.	Mathematical Thinking at Grade 1 Investigation 5: Session 1-6 Survey Questions and Secret Rules Investigation 2: Session 1-6 Investigation 3: Session 1-3 Investigation 4: Session 1-5
D. Describe the probability of chance events as more, less or equally likely to occur.	8. Describe the likelihood of simple events as possible/impossible and more likely/less likely; e.g., when using spinners or number cubes in classroom activities.	Survey Questions and Secret Rules Investigation 4: Session 4-5

**Investigations in Number, Data, & Space  
Cincinnati Pacing Guide  
Grade Two**

Number, Number Sense	Indicators	Investigations in Number, Data, & Space
<p>A. Use place value concepts to represent whole numbers using numerals, words and physical models.</p>	<p>1. Use place value concepts to represent, compare and order whole numbers using physical models, numerals and words, with ones, tens and hundreds. <i>For example:</i></p>	<p>Mathematical Thinking at Grade 2 Investigation 2: Sessions 6, 8 Investigation 4: Session 1-5 Coins, Coupons, and Combinations Investigation 1: Session 1-3 Investigation 4: Session 1-4 Putting Together and Taking Apart Investigation 2: Session 1-7 Investigation 4: Session 1-4 Investigation 5: Sessions 2-3, 6</p>
	<p>a. Recognize 10 can mean “10 ones” or a single entity (1 ten) through physical models and trading games.</p>	<p>Mathematical Thinking at Grade 2 Investigation 1: Session 1 Putting Together and Taking Apart Investigation 2: Session 1-7 Investigation 4: Session 1-4 Investigation 5: Sessions 2-3, 6</p>
	<p>b. Read and write 3-digit numerals (e.g., 243 as two hundred forty three, 24 tens and 3 ones, or 2 hundreds and 43 ones, etc.) and construct models to represent each.</p>	<p>Coins, Coupons, and Combinations Investigation 4: Session 1-4 Putting Together and Taking Apart Investigation 2: Session 1-7 Investigation 4: Session 1-4 Investigation 5: Sessions 2-3, 6</p>

Number, Number Sense	Indicators	Investigations in Number, Data, & Space
<p>B. Recognize, classify, compare and order whole numbers.</p>	<p>1. Use place value concepts to represent, compare and order whole numbers using physical models, numerals and words, with ones, tens and hundreds. <i>For example:</i></p>	<p>Mathematical Thinking at Grade 2 Investigation 1: Session 1 Investigation 2: Sessions 1-3, 6, 8 Investigation 5: Session 1-3 Coins, Coupons, and Combinations Investigation 1: Session 1-10 Investigation 2: Session 10 Investigation 3: Session 1-5 Investigation 4: Session 2-4 Putting Together and Taking Apart Investigation 2: Session 1-7 Investigation 4: Session 1-4 Investigation 5: Sessions 2-3, 6</p>
	<p>a. Recognize 10 can mean “10 ones” or a single entity (1 ten) through physical models and trading games.</p>	<p>Mathematical Thinking at Grade 2 Investigation 1: Session 1 Investigation 4: Session 2-4 Putting Together and Taking Apart Investigation 2: Session 1-7 Investigation 4: Session 1-4 Investigation 5: Sessions 2-3, 6</p>
	<p>b. Read and write 3-digit numerals (e.g., 243 as two hundred forty three, 24 tens and 3 ones, or 2 hundreds and 43 ones, etc.) and construct models to represent each.</p>	<p>Coins, Coupons and Combinations Investigation 4: Session 1-4 Putting Together and Taking Apart Investigation 2: Session 1-7 Investigation 4: Session 1-4 Investigation 5: Sessions 2-3, 6</p>

Number, Number Sense	Indicators	Investigations in Number, Data, & Space
(continued)	2. Recognize and classify numbers as even or odd.	Coins, Coupons and Combinations Investigation 2: Session 1-10 Investigation 4: Session 1-4 Putting Together and Taking Apart Investigation 2: Session 1-4
C. Represent commonly used fractions using words and physical models.	5. Represent fractions (halves, thirds, fourths, sixths and eighths), using words, numerals and physical models. <i>For example:</i>	Shapes, Halves and Symmetry Investigation 3: Session 1-8
	a. Recognize that a fractional part can mean different amounts depending on the original quantity.	Shapes, Halves and Symmetry Investigation 3: Session 1-8
	b. Recognize that a fractional part of a rectangle does not have to be shaded with contiguous parts.	Shapes, Halves and Symmetry Investigation 3: Session 1-8
	c. Identify and illustrate parts of a whole and parts of sets of objects.	Shapes, Halves and Symmetry Investigation 3: Session 1-8
	d. Compare and order physical models of halves, thirds and fourths in relations to 0 and 1.	Shapes, Halves and Symmetry Investigation 3: Session 1-8



Number, Number Sense	Indicators	Investigations in Number, Data, & Space
D. Determine the value of a collection of coins and dollar bills.	4. Represent and write the value of money using the ¢ sign and in decimal form when using the \$ sign.	Mathematical Thinking at Grade 2 Investigation 4: Session 2 Coins, Coupons, and Combinations Investigation 2: Session 6-9 Putting Together and Taking Apart Investigation 2: Session 5-6 Investigation 4: Session 3-4
E. Make change using coins for values up to one dollar.	3. Count money and make change using coins and a dollar bill.	Mathematical Thinking at Grade 2 Investigation 4: Session 2 Coins, Coupons, and Combinations Investigation 2: Session 6-9 Putting Together and Taking Apart Investigation 2: Session 5-6 Investigation 4: Session 3-4
F. Count, using numerals and ordinal numbers.		Mathematical Thinking at Grade 2 Investigation 2: Session 4-8 Investigation 4: Session 1-5 Coins, Coupons, and Combinations Investigation 2: Session 1-10 Investigation 4: Session 1-4 Putting Together and Taking Apart Investigation 2: Session 1-7

Number, Number Sense	Indicators	Investigations in Number, Data, & Space
G. Model, represent and explain addition as combining sets and counting on.		Mathematical Thinking at Grade 2 Investigation 1: Session 1 Investigation 2: Sessions 1-3, 6, 8 Investigation 4: Session 1-5 Investigation 5: Session 3 Coins, Coupons, and Combinations Investigation 1: Session 1-11 Investigation 3: Session 1-2 Investigation 4: Session 2-4 Putting Together and Taking Apart Investigation 1: Sessions 1, 3-6 Investigation 2: Session 1-7 Investigation 3: Sessions 1, 3-5 Investigation 4: Session 1-4 Investigation 5: Session 1-6
H. Model, represent and explain subtraction as comparison, take-away and part-to-whole.	6. Model, represent and explain subtraction as comparison, take-away and part-to-whole; e.g., solve missing addend problems by counting up or subtracting, such as “I had six baseball cards, my sister gave me more, and I now have ten. How many did she	Coins, Coupons, and Combinations Investigation 3: Session 3-5 Putting Together and Taking Apart Investigation 1: Session 2-6 Investigation 3: Session 2-5 Investigation 5: Session 7-8

Number, Number Sense	Indicators	Investigations in Number, Data, & Space
I. Model, represent and explain multiplication as repeated addition, rectangular arrays and skip counting.	6. Model, represent and explain multiplication as repeated addition, rectangular arrays and skip counting.	Mathematical Thinking at Grade 2 Investigation 2: Session 6 Investigation 4: Session 1-2 Shapes, Halves and Symmetry Investigation 2: Session 3 Coins, Coupons, and Combinations Investigation 2: Sessions 1-5, 10
J. Model, represent and explain division as sharing equally, repeated subtraction and rectangular arrays.	8. Model, represent and explain division as sharing equally and repeated subtraction.	Can be developed from Mathematical Thinking at Grade 2 Investigation 4: Session 1 Coins, Coupons, and Combinations Investigation 2: Sessions 1, 3-5, 10
K. Demonstrate fluency in addition facts with addends through 9 and corresponding subtractions	10. Demonstrate fluency in addition facts with addends through 9 and corresponding subtractions; e.g., $9 + 9 = 18$ , $18 - 9 = 9$ .	Mathematical Thinking at Grade 2 Investigation 2: Sessions 1-3, 6, 8 Investigation 5: Session 1-3 Coins, Coupons, and Combinations Investigation 1: Session 1-11
	11. Add and subtract multiples of 10.	Coins, Coupons, and Combinations Investigation 1: Session 1-3 Investigation 4: Session 1-5 Putting Together and Taking Apart Investigation 2: Session 1-7 Investigation 4: Session 1-4

Number, Number Sense	Indicators	Investigations in Number, Data, & Space
L. Demonstrate fluency in adding and subtracting multiples of 10, and recognize combinations that make 10.	11. Add and subtract multiples of 10.	Coins, Coupons, and Combinations Investigation 1: Session 1-3 Investigation 4: Session 1-5 Putting Together and Taking Apart Investigation 2: Session 1-7 Investigation 4: Session 1-4
M. Add and subtract two-digit numbers with and without regrouping.	9. Model and use the commutative property for addition.	Coins, Coupons, and Combinations Investigation 1: Sessions 7, 10-11 Investigation 3: Session 1-5 Investigation 4: Session 1-5 Putting Together and Taking Apart Investigation 1: Session 3-6 Investigation 2: Session 1-7 Investigation 4: Session 1-4
	12. Demonstrate multiple strategies for adding and subtracting 2- or 3-digit whole numbers, such as:	Coins, Coupons, and Combinations Investigation 1: Sessions 7, 10-11 Investigation 3: Session 1-5 Investigation 4: Session 1-5 Putting Together and Taking Apart Investigation 1: Session 3-6 Investigation 2: Session 1-7 Investigation 4: Session 1-4

Number, Number Sense	Indicators	Investigations in Number, Data, & Space
(continued)	a. compatible numbers;	Coins, Coupons, and Combinations Investigation 1: Sessions 7, 10-11 Investigation 3: Session 1-5 Investigation 4: Session 1-5 Putting Together and Taking Apart Investigation 1: Session 3-6 Investigation 2: Session 1-7 Investigation 4: Session 1-4
	b. compensatory numbers;	Coins, Coupons, and Combinations Investigation 1: Sessions 7, 10-11 Investigation 3: Session 1-5 Investigation 4: Session 1-5 Putting Together and Taking Apart Investigation 1: Session 3-6 Investigation 2: Session 1-7 Investigation 4: Session 1-4
	c. informal use of commutative and associative properties of addition.	Coins, Coupons, and Combinations Investigation 1: Sessions 7, 10-11 Investigation 3: Session 1-5 Investigation 4: Session 1-5 Putting Together and Taking Apart Investigation 1: Session 3-6 Investigation 2: Session 1-7 Investigation 4: Session 1-4

Number, Number Sense	Indicators	Investigations in Number, Data, & Space
(continued)	<p><i>Note: There are instances where a grade-level indicator is linked to a benchmark for a grade band that does not include the grade level of the indicator. See Grade 3 for indicator 13.</i></p>	<p>Grade 3  Combining and Comparing  Ten Minute Math: Estimation and Number Sense</p>

Measurement Standard	Indicators	Investigations in Number, Data, & Space
A. Explain the need for standard units of measure.		How Long? How Far? Investigation 1: Session 1-8 Investigation 2: Session 1-5
B. Select appropriate units for length, weight, volume (capacity) and time, using:	1. Identify and select appropriate units of measure for:	Grade 1, Bigger, Taller, Heavier, Smaller Investigation 1: Session 1-6 Investigation 2: Session 1-7 Investigation 3: Session 1-5
<ul style="list-style-type: none"> <li>• objects; i.e., non-standard units;</li> </ul>	a. length – centimeters, meters, inches, feet, or yards;	Grade 1, Bigger, Taller, Heavier, Smaller Investigation 3: Session 1-5
<ul style="list-style-type: none"> <li>• U.S. customary units: inch, foot, yard, ounce, pound, cup, quart, gallon, minute, hour, day, week and year;</li> </ul>	b. volume (capacity) – liters, cups, pints, or quarts;	Grade 1, Bigger, Taller, Heavier, Smaller Investigation 2: Session 1-7
<ul style="list-style-type: none"> <li>• metric units: centimeter, meter, gram and liter.</li> </ul>	c. weight – grams, ounces, or pounds;	Grade 1, Bigger, Taller, Heavier, Smaller Investigation 1: Session 1-6
C. Develop common referents for units of measure for length, weight, volume (capacity) and time to make comparisons and estimates.	2. Establish personal or common referents for units of measure to make estimates and comparisons; e.g., the width of a finger is a centimeter, a large bottle of soda pop is 2 liters, a small paper clip weighs about one gram.	How Long? How Far? Investigation 1: Session 1-8

Number, Number Sense	Indicators	Investigations in Number, Data, & Space
(continued)	4. Tell time to the nearest minute interval on digital and to the nearest 5 minute interval on analog (dial) timepieces.	Each text has an Appendix: About Classroom Routines which includes a feature entitled Time and Time Again. This section describes time-related activities and schedules.
D. Apply measurement techniques to measure length, weight and volume (capacity).	5. Estimate and measure the length and weight of common objects, using metric and U.S. customary units, accurate to the nearest unit.	Grade 1, Bigger, Taller, Heavier, Smaller Investigation 3: Session 1-5
	6. Select and use appropriate measurement tools; e.g., a ruler to draw a segment 3 inches long, a measuring cup to place 2 cups of rice in a bowl, a scale to weigh 50 grams of candy.	Grade 1, Bigger, Taller, Heavier, Smaller Investigation 1: Session 1-6 Investigation 2: Session 1-7 Investigation 3: Session 1-5
E. Recognize that using different units of measurement will yield different numbers for the same measurement.	3. Describe and compare the relationships among units of measure, such as centimeters and meters; inches, feet and yards; cups, pints and quarts; ounces and pounds; and hours, half-hours, and quarter-hours; e.g., how many inches in a foot?	Grade 1, Bigger, Taller, Heavier, Smaller Investigation 1: Session 1-6 Investigation 2: Session 1-7 Investigation 3: Session 1-5
	7. Make and test predictions about measurements, using different units to measure the same length or volume.	Grade 1, Bigger, Taller, Heavier, Smaller Investigation 1: Session 1-6 Investigation 2: Session 1-7 Investigation 3: Session 1-5



<b>Geometry and Spatial Sense</b>	<b>Indicators</b>	<b>Investigations in Number, Data, &amp; Space</b>
A. Describe and create plane figures: circle, rectangle, square, triangle, hexagon, trapezoid, parallelogram and rhombus, and identify them in the environment.	1. Identify, describe, compare, and sort three-dimensional objects (i.e., cubes, spheres, prisms, cones, cylinders and pyramids) according to the shape of the faces or the numbers of faces, edges, or vertices.	Mathematical Thinking at Grade 2 Investigation 3: Session 1-2 Shapes, Halves and Symmetry Investigation 1: Session 1-8 Investigation 2: Session 1-6
	2. Predict what new shapes will be formed by combining or cutting apart existing shapes.	Shapes, Halves and Symmetry Investigation 1: Session 2-3 Investigation 2: Session 1-6
B. Describe solid objects: cube, rectangular prism, sphere, cylinder, cone and pyramid, and identify them in the environment.	1. Identify, describe, compare, and sort three-dimensional objects (i.e., cubes, spheres, prisms, cones, cylinders and pyramids) according to the shape of the faces or the numbers of faces, edges, or vertices.	Mathematical Thinking at Grade 2 Investigation 3: Session 1-2 Shapes, Halves and Symmetry Investigation 1: Session 1-8 Investigation 2: Session 1-6
C. Sort and compare two-dimensional figures and three-dimensional objects according to their characteristics and properties.	1. Identify, describe, compare, and sort three-dimensional objects (i.e., cubes, spheres, prisms, cones, cylinders and pyramids) according to the shape of the faces or the numbers of faces, edges, or vertices.	Mathematical Thinking at Grade 2 Investigation 3: Session 1-2 Shapes, Halves and Symmetry Investigation 1: Session 1-8 Investigation 2: Session 1-6

Geometry and Spatial Sense	Indicators	Investigations in Number, Data, & Space
D. Identify, explain and model (superposition, copying) the concept of shapes being congruent and similar.	4. Identify and determine whether two-dimensional shapes are congruent (same shape and size) or similar (same shape different size) by copying or using superposition (lay one thing on top of another).	Shapes, Halves and Symmetry Investigation 1: Session 1-8 Investigation 2: Session 1-6 Investigation 3: Session 3-5
E. Recognize two- and three-dimensional objects from different positions.	3. Recognize two-dimensional shapes and three-dimensional objects from different positions.	Mathematical Thinking at Grade 2 Investigation 3: Sessions 1-4, 6 Shapes, Halves and Symmetry Investigation 1: Session 1-8 Investigation 2: Session 1-6
F. Describe location, using comparative (before, after), directional (above, below), and positional (first, last) words.		Can be developed from How Long? How Far? Investigation 2: Session 6-8
G. Identify and draw figures with line symmetry.	5. Create and identify two-dimensional figures with line symmetry; e.g., what letter shapes, logos, polygons are symmetrical?	Shapes, Halves and Symmetry Investigation 4: Session 1-7

Patterns, Functions and Algebra	Indicators	Investigations in Number, Data, & Space
A. Sort, classify, and order objects by size, number, and other properties, and describe the attributes used.		Mathematical Thinking at Grade 2 Investigation 1: Session 4 Investigation 3: Session 5 Does It Walk, Crawl or Swim? Investigation 1: Session 1-6
B. Extend sequences of sounds and shapes or simple number patterns, and create and record similar patterns.	1. Extend simple number patterns (both repeating and growing patterns), and create similar patterns using different objects, such as using physical materials or shapes to represent numerical patterns.	Coins, Coupons and Combinations Investigation 2: Sessions 1-5, 10 Putting Together and Taking Apart Investigation 2: Session 1-2
C. Create and extend patterns and describe the rule in words.	2. Use patterns to make generalizations and predictions; e.g., determine a missing element in a pattern.	Mathematical Thinking at Grade 2 Investigation 3: Session 1-4 Timelines and Rhythm Patterns Investigation 2: Session 1-5
	3. Create new patterns with consistent rules or plans, and describe the rule or general plan of existing patterns.	Mathematical Thinking at Grade 2 Investigation 3: Session 1-4 Timelines and Rhythm Patterns Investigation 2: Session 1-5

Patterns, Functions and Algebra	Indicators	Investigations in Number, Data, & Space
D. Model problem situations using objects, pictures, tables, numbers, letters, and other symbols.	4. Use objects, pictures, numbers and other symbols to represent a problem situation.	Mathematical Thinking at Grade 2 Investigation 2: Session 1-8 Coins, Coupons and Combinations Investigation 3: Session 1-5 Does It Walk, Crawl or Swim? Investigation 2: Session 1-4 Shapes, Halves and Symmetry Investigation 1: Session 1-8 Putting Together and Taking Apart Investigation 5: Session 1-8 How Long? How Far? Investigation 1: Session 1-4 How Many Pockets? How Many Teeth? Investigation 3: Session 1-5 Timelines and Rhythm Patterns Investigation 1: Session 1-6
E. Solve open sentences and explain strategies.	5. Understand equivalence and extend the concept to situations involving symbols; e.g., $4 + 5 = 9$ and $9 = 4 + 5$ and $4 + 5 = 3 + 6 = \Delta + \square \dots$	Mathematical Thinking at Grade 2 Investigation 2: Sessions 1-3, 6, 8 Coins, Coupons and Combinations Investigation 1: Sessions 1-3, 10
F. Represent an unknown quantity as a variable using a symbol, such as $\square$ ,	6. Use symbols to represent unknown quantities and identify values for symbols in an expression or equation using addition and subtraction; e.g., $\square + O = 10$ , $\Delta - 2 = 4$ .	Mathematical Thinking at Grade 2 Investigation 2: Sessions 1-3, 6, 8 Investigation 5: Session 3 Coins, Coupons and Combinations Investigation 1: Session 8-9 Putting Together and Taking Apart Investigation 3: Session 1-5

<b>Patterns, Functions and Algebra</b>	<b>Indicators</b>	<b>Investigations in Number, Data, &amp; Space</b>
G. Describe and compare qualitative and quantitative change.	7. Describe qualitative and quantitative changes, especially those involving addition and subtraction; e.g., a student growing taller versus a student growing two inches in one year.	Can be developed from Mathematical Thinking at Grade 2 Investigation 5: Session 4-5 How Many Pockets? How Many Teeth? Investigation 1: Session 1-5 Investigation 2: Session 1-6

Data Analysis & Probability	Indicators	Investigations in Number, Data, & Space
A. Pose questions and gather data about everyday situations and familiar objects.	1. Pose questions, use observations, interviews and surveys to collect data, and organize data in charts, picture graphs and bar graphs.	Mathematical Thinking at Grade 2 Investigation 2: Session 6 Investigation 5: Session 1-6 Coins, Coupons and Combinations Investigation 1: Session 11 Investigation 2: Session 10 Does It Walk, Crawl or Swim? Investigation 1: Session 1-3 Investigation 2: Session 1-4 Investigation 3: Session 1-3 Investigation 4: Session 1-3 How Many Pockets? How Many Teeth? Investigation 1: Session 1-5 Investigation 2: Session 1-6 Investigation 3: Session 1-5
	6. Recognize that data may vary from one population to another; e.g., favorite TV shows of students and of parents.	Mathematical Thinking at Grade 2 Investigation 2: Session 6 Investigation 5: Session 1-6 Coins, Coupons and Combinations Investigation 1: Session 11 Investigation 2: Session 10 Does It Walk, Crawl or Swim? Investigation 1: Session 1-3 Investigation 2: Session 1-4 Investigation 3: Session 1-3 Investigation 4: Session 1-3

Data Analysis & Probability	Indicators	Investigations in Number, Data, & Space
(continued)		How Many Pockets? How Many Teeth? Investigation 1: Session 1-5 Investigation 2: Session 1-6 Investigation 3: Session 1-5
B. Sort and classify objects by attributes, and organize data into categories in a simple table or chart.	1. Pose questions, use observations, interviews and surveys to collect data, and organize data in charts, picture graphs and bar graphs.	Mathematical Thinking at Grade 2 Investigation 2: Session 6 Investigation 6: Session 1-6 Coins, Coupons and Combinations Investigation 1: Session 11 Does It Walk, Crawl or Swim? Investigation 1: Session 1-3 Investigation 2: Session 1-4 Investigation 3: Session 1-3 Investigation 4: Session 1-3 How Many Pockets? How Many Teeth? Investigation 1: Session 1-5 Investigation 2: Session 1-6 Investigation 3: Session 1-5

Data Analysis & Probability	Indicators	Investigations in Number, Data, & Space
(continued)	4. Write a few sentences to describe and compare categories of data represented in a chart or graph, and make statements about the data as a whole.	Mathematical Thinking at Grade 2 Investigation 2: Session 6 Investigation 6: Session 1-6 Coins, Coupons and Combinations Investigation 1: Session 11 Does It Walk, Crawl or Swim? Investigation 1: Session 1-3 Investigation 2: Session 1-4 Investigation 3: Session 1-3 Investigation 4: Session 1-3 How Many Pockets? How Many Teeth? Investigation 1: Session 1-5 Investigation 2: Session 1-6 Investigation 3: Session 1-5
C. Represent data using objects, picture graphs and bar graphs.	2. Read, interpret and make comparisons and predictions from data represented in charts, line plots, picture graphs and bar graphs.	Mathematical Thinking at Grade 2 Investigation 5: Sessions 12, 6 Does It Walk, Crawl or Swim? Investigation 1: Session 1-2 Investigation 2: Session 3-4 Investigation 3: Session 2-3 Investigation 4: Session 1-3 How Many Pockets? How Many Teeth? Investigation 1: Session 1-5 Investigation 2: Session 1-6 Investigation 3: Session 1-5



Data Analysis & Probability	Indicators	Investigations in Number, Data, & Space
(continued)	3. Read and construct simple timelines to sequence events.	Timelines and Rhythm Patterns Investigation 1: Session 1-6
	5. Identify untrue or inappropriate statements about a given set of data.	Mathematical Thinking at Grade 2 Investigation 5: Sessions 12, 6 Coins, Coupons and Combinations Investigation 1: Session 11 Investigation 2: Session 10 Does It Walk, Crawl or Swim? Investigation 1: Session 1-3 Investigation 2: Session 1-4 Investigation 3: Session 1-3 Investigation 4: Session 1-3 How Many Pockets? How Many Teeth? Investigation 1: Session 1-5 Investigation 2: Session 1-6 Investigation 3: Session 1-5
D. Describe the probability of chance events as more, less or equally likely to occur.	7. List some of the possible outcomes of a simple experiment, and predict whether given outcomes are more, less or equally likely to occur.	The concept of probability is introduced in Grade 3. Students in Grade 2 may predict future events based on collected data. Does It Walk, Crawl or Swim? Investigation 2: Session 3-4 How Many Pockets? How Many Teeth? Investigation 2: Sessions 3, 6

Data Analysis & Probability	Indicators	Investigations in Number, Data, & Space
	8. Use physical models and pictures to represent possible arrangements of 2 or 3 objects.	<p>The concept of probability is introduced in Grade 3. Students in Grade 2 may predict future events based on collected data.</p> <p>Does It Walk, Crawl or Swim? Investigation 2: Session 3-4</p> <p>How Many Pockets? How Many Teeth? Investigation 2: Sessions 3, 6</p>

**Investigations in Number, Data, & Space  
Cincinnati Pacing Guide  
Grade Three**

Number, Number Sense	Indicators	Investigations in Number, Data, & Space
<p>A. Use place value structure of the base-ten number system to read, write, represent and compare whole numbers and decimals.</p>	<p>2. Use place value concepts to represent whole numbers and decimals using numerals, words, expanded notation and physical models. For example:</p>	<p>Mathematical Thinking at Grade 3 Investigation 1: Session 1-3 Things That Come in Groups Investigation 1: Session 2 Investigation 3: Session 1-5 Investigation 4: Session 1-2 Flips, Turns, and Area Ten Minute Math: Broken Calculator Landmarks in the Hundreds Investigation 1: Session 1-7 Investigation 3: Session 1-3 Combining and Comparing Investigation 4: Session 3-4</p>
	<p>a. Recognize 100 means “10 tens” as well as a single entity (1 hundred) through physical models and trading games</p>	<p>Mathematical Thinking at Grade 3 Investigation 1: Session 1-3 Flips, Turns, and Area Ten Minute Math: Broken Calculator Landmarks in the Hundreds Investigation 1: Session 1-7 Combining and Comparing Investigation 4: Session 3-4</p>

Number, Number Sense	Indicators	Investigations in Number, Data, & Space
(continued)	<p>b. Describe the multiplicative nature of the number system; e.g., the structure of 3205 as <math>3 \times 1000</math> plus <math>2 \times 100</math> plus <math>5 \times 1</math>.</p>	<p>Mathematical Thinking at Grade 3            Investigation 1: Session 1-3            Flips, Turns, and Area            Ten Minute Math: Broken Calculator            Landmarks in the Hundreds            Investigation 1: Session 1-7            Investigation 3: Session 1-3            Combining and Comparing            Investigation 4: Session 3-4</p>
	<p>c. Model the size of 1000 in multiple ways; e.g., packaging 1000 objects into 10 boxes of 100, modeling a meter with centimeter and decimeter strips, or gathering 1000 pop-can tabs.</p>	<p>Landmarks in the Hundreds            Investigation 3: Session 1-3</p>
	<p>d. Explain the concept of tenths and hundredths using physical such models, as metric pieces, base ten blocks, decimal squares or money.</p>	<p>Can be developed from            Mathematical Thinking at Grade 3            Investigation 2: Session 5-7            Landmarks in the Hundreds            Investigation 1: Session 6-7            Investigation 2: Session 4            Fair Shares            Investigation 3: Session 1-3</p>
	<p>3. Use mathematical language and symbols to compare and order; e.g., less than, greater than, at most, at least, <math>&lt;</math>, <math>&gt;</math>, <math>=</math>, <math>\leq</math>, <math>\geq</math>.</p>	<p>Mathematical Thinking at Grade 3            Investigation 3: Session 3-4            Combining and comparing            Investigation 1: Session 1-3            Investigation 4: Session 1-2            Investigation 4: Session 1-3</p>

Number, Number Sense	Indicators	Investigations in Number, Data, & Space
B. Recognize and generate equivalent representations for whole numbers, fractions and decimals.	1. Identify and generate equivalent forms of whole numbers; e.g., 36, $30+6$ , $9 \times 4$ , 46-10, number of inches in a yard.	Mathematical Thinking at Grade 3 Investigation 1: Session 1-3 Investigation 2: Session 1-2 Flips, Turns, and Area Ten-Minute Math: Broken Calculator Landmarks in the Hundreds Investigation 2: Session 1-3 Investigation 3: Session 1-3 Combining and Comparing Investigation 4: Session 3-4
	7. Recognize and use decimal and fraction concepts and notations as related ways of representing parts of a whole or a set; e.g., 3 of 10 marbles are red can also be described as and 3 tenths are red.	Fair Shares Investigation 1: Session 1-4 Investigation 2: Session 1-7 Investigation 3: Session 1-3
C. Represent commonly used fractions and mixed numbers using words and physical models.	5. Represent fractions and mixed numbers using words, numerals and physical models.	Fair Shares Investigation 1: Session 1-4 Investigation 2: Session 1-7 Investigation 3: Session 1-3

Number, Number Sense	Indicators	Investigations in Number, Data, & Space
D. Use models, points of reference and equivalent forms of commonly used fractions to judge the size of fractions and to compare, describe and order them.	3. Use mathematical language and symbols to compare and order; e.g., less than, greater than, at most, at least, $<$ , $>$ , $=$ , $\leq$ , $\geq$ .	Fair Shares Investigation 1: Session 1-4 Investigation 2: Session 1-7 Investigation 3: Session 1-3
	6. Compare and order commonly used fractions and mixed numbers using number lines, models (such as fraction circles or bars), points of reference (such as more or less than $\frac{1}{2}$ ), and equivalent forms found using physical or visual models.	Fair Shares Investigation 1: Session 1-4 Investigation 2: Session 1-7 Investigation 3: Session 1-3
E. Recognize and classify numbers as prime or composite and list factors.		Mathematical Thinking at Grade 3 Investigation 1: Session 1 Things That Come in Groups Investigation 1: Session 2 Investigation 3: Session 1-5 Landmarks in the Hundreds Investigation 1: Session 2-5 Investigation 3: Session 1
F. Count money and make change using both coins and paper bills.	4. Count money and make change using coins and paper bills to ten dollars.	Mathematical Thinking at Grade 3 Investigation 2: Session 5-7 Things That Come in Groups Investigation 5: Session 1 Landmarks in the Hundreds Investigation 1: Session 6-7

Number, Number Sense	Indicators	Investigations in Number, Data, & Space
G. Model and use commutative and associative properties for addition and multiplication.	11. Model and use the commutative and associative properties for addition and multiplication.	Mathematical Thinking at Grade 3 Investigation 2: Session 2 Things That Come in Groups Investigation 1: Session 2 Investigation 3: Session 1-4 Landmarks in the Hundreds Investigation 2: Session 5-6 Combining and Comparing Investigation 3: Session 3
H. Use relationships between operations, such as subtraction as the inverse of addition and division as the inverse of multiplication.	10. Explain and use relationships between operations, such as:	Mathematical Thinking at Grade 3 Investigation 2: Session 3-4 Things That Come in Groups Investigation 1: Sessions 1-4, 3 Investigation 2: Session 1-6 Investigation 3: Sessions 1-5, 3-4 Investigation 4: Session 1-4 Investigation 5: Sessions 1-4, 4 Ten-Minute Math: Counting Around The Class Landmarks in the Hundreds Investigation 1: Sessions 1-7, 2-7 Investigation 2: Sessions 1-6, 4-6 Ten-Minute Math: Counting Around The Class Up and Down the Number Line Investigation 1: Session 1-4 Combining and Comparing Investigation 4: Session 2 Turtle Paths Investigation 1: Session 3-4

Number, Number Sense	Indicators	Investigations in Number, Data, & Space
(continued)	a. relate addition and subtraction as inverse operations;	Up and Down the Number Line Investigation 1: Session 1-4 Combining and Comparing Investigation 4: Session 2 Turtle Paths Investigation 1: Session 3-4
	b. relate multiplication and division as inverse operations;	Mathematical Thinking at Grade 3 Investigation 2: Session 3-4 Things That Come in Groups Investigation 1: Session 3 Investigation 3: Session 3-4 Investigation 4: Session 1-4 Investigation 5: Session 4 Landmarks in the Hundreds Investigation 1: Session 2-7 Investigation 2: Session 4-6



Number, Number Sense	Indicators	Investigations in Number, Data, & Space
(continued)	c. relate addition to multiplication (repeated addition);	Mathematical Thinking at Grade 3 Investigation 2: Session 3-4 Things That Come in Groups Investigation 1: Session 1-4 Investigation 2: Session 1-6 Investigation 3: Session 1-5 Investigation 4: Session 1-4 Investigation 5: Session 1-4 Ten-Minute Math: Counting Around the Class Landmarks in the Hundreds Investigation 1: Session 2-7 Investigation 2: Session 1-6 Ten-Minute Math: Counting Around the Class
	d. relate subtraction to division (repeated subtraction).	Things That Come in Groups Investigation 1: Session 1-4 Investigation 2: Session 1-6 Investigation 3: Session 1-5 Investigation 4: Session 1-4 Investigation 5: Session 1-4 Ten-Minute Math: Counting Around the Class Landmarks in the Hundreds Investigation 1: Session 1-7 Investigation 2: Session 1-6 Ten-Minute Math: Counting Around the Class

Number, Number Sense	Indicators	Investigations in Number, Data, & Space
I. Demonstrate fluency in multiplication facts with factors through 10 and corresponding divisions.	13. Demonstrate fluency in multiplication facts through 10 and corresponding division facts.	Mathematical Thinking at Grade 3 Investigation 2: Session 3-4 Things That Come in Groups Investigation 1: Session 1-4 Investigation 2: Session 2-6 Investigation 3: Session 1-5 Investigation 4: Session 1-4 Investigation 5: Session 1-4 Landmarks in the Hundreds Investigation 1: Session 2-7 Investigation 2: Session 4-6
J. Estimate the results of whole number computations using a variety of strategies, and judge the reasonableness.	<i>13. Estimate the results of whole number addition and subtraction problems using front-end estimation, and judge the reasonableness of the answers. (Grade 2)</i>	Combining and Comparing Ten Minute Math: Estimation and Number Sense

Number, Number Sense	Indicators	Investigations in Number, Data, & Space
(continued)	15. Evaluate the reasonableness of computations based upon operations and the numbers involved; e.g., considering relative size, place value and estimates.	Mathematical Thinking at Grade 3 Investigation 3: Session 3-4 Things That Come in Groups Investigation 4: Session 1-4 From Paces to Feet Investigation 1: Session 1-4 Ten-Minute Math: Estimation and Number Sense Landmarks in the Hundreds Investigation 2: Session 4-6 Investigation 3: Session 2-3 Up and Down the Number Line Ten-Minute Math: Estimation and Number Sense Combining and Comparing Investigation 1: Session 1-2 Investigation 2: Session 1-2 Investigation 3: Session 1-3 Investigation 4: Session 1-4 Investigation 5: Session 1-2 Turtle Paths Investigation 2: Session 1-2 Ten-Minute Math: Lengths and Perimeters

Number, Number Sense	Indicators	Investigations in Number, Data, & Space
K. Analyze and solve multi-step problems involving addition, subtraction, multiplication and division using whole numbers.	12. Add and subtract whole numbers with and without regrouping.	Mathematical Thinking at Grade 3 Investigation 2: Session 1-7 Investigation 3: Session 3-4 Combining and Comparing Investigation 1: Session 1-3 Investigation 2: Session 2 Investigation 3: Session 1-3 Investigation 4: Session 1-4 Investigation 5: Session 1-3
	14. Multiply and divide 2- and 3-digit numbers by a single-digit number, without remainders for division.	Mathematical Thinking at Grade 3 Investigation 2: Session 3-4 Things That Come in Groups Investigation 1: Session 1-4 Investigation 2: Session 2-6 Investigation 3: Session 1-5 Investigation 4: Session 1-4 Investigation 5: Session 1-4 Landmarks in the Hundreds Investigation 1: Session 2-7 Investigation 2: Session 4-6

Number, Number Sense	Indicators	Investigations in Number, Data, & Space
<p>L. Use a variety of methods and appropriate tools (mental math, paper and pencil, calculators) for computing with whole numbers.</p>	<p>8. Model, represent and explain multiplication; e.g., repeated addition, skip counting, rectangular arrays and area model. For example:</p>	<p>Mathematical Thinking at Grade 3            Investigation 2: Session 3-4            Things That Come in Groups            Investigation 1: Session 1-4            Investigation 2: Session 2-6            Investigation 3: Session 1-5            Investigation 4: Session 1-4            Investigation 5: Sessions 1-4, 2            Landmarks in the Hundreds            Investigation 1: Session 2-7            Investigation 2: Session 4-6, 5-6</p>
	<p>a. Use conventional mathematical symbols to write equations for word problems involving multiplication.</p>	<p>Things That Come in Groups            Investigation 4: Session 1-4            Investigation 5: Session 2            Landmarks in the Hundreds            Investigation 2: Session 5-6</p>
	<p>b. Understand that, unlike addition and subtraction, the factors in multiplication and division may have different units; e.g., 3 boxes of 5 cookies each.</p>	<p>Mathematical Thinking at Grade 3            Investigation 2: Session 3-4            Things That Come in Groups            Investigation 1: Session 1-4            Investigation 2: Session 2-6            Investigation 3: Session 1-5            Investigation 4: Session 1-4            Investigation 5: Session 1-4            Landmarks in the Hundreds            Investigation 1: Session 2-7            Investigation 2: Session 4-6</p>

Number, Number Sense	Indicators	Investigations in Number, Data, & Space
(continued)	9. Model, represent and explain division; e.g., sharing equally, repeated subtraction, rectangular arrays and area model. For example:	Things That Come in Groups Investigation 1: Session 1-4 Investigation 2: Session 1-6 Investigation 3: Session 1-5 Investigation 4: Session 1-4 Investigation 5: Session 1-4 Landmarks in the Hundreds Investigation 1: Session 1-7 Investigation 2: Session 1-6
	a. Translate contextual situations involving division into conventional mathematical symbols.	Things That Come in Groups Investigation 1: Session 1-4 Investigation 2: Session 1-6 Investigation 3: Session 1-5 Investigation 4: Session 1-4 Investigation 5: Session 1-4 Landmarks in the Hundreds Investigation 1: Session 1-7 Investigation 2: Session 1-6
	b. Explain how a remainder may impact an answer in a real-world situation; e.g., 14 cookies being shared by 4 children.	Things That Come in Groups Investigation 4: Session 1-2 Landmarks in the Hundreds Investigation 1: Session 6-7 Investigation 2: Session 5-6
M. Add and subtract commonly used fractions with like denominators and decimals, using models and paper and pencil.		Fair Shares Investigation 1: Session 1-4 Investigation 2: Session 1-4 Investigation 3: Session 1-3

Number, Number Sense	Indicators	Investigations in Number, Data, & Space
A. Select appropriate units for perimeter, area, weight, volume (capacity), time and temperature using:	1. Identify and select appropriate units for measuring:	From Paces to Feet Investigation 1: Session 1-6 Investigation 2: Session 1-7 Investigation 4: Session 1-3 Combining and Comparing Investigation 2: Session 1-2
· objects of uniform size;	a. length – miles, kilometers and other units of measure as appropriate.	From Paces to Feet Investigation 1: Session 1-6 Investigation 2: Session 1-7 Investigation 4: Session 1-3 Combining and Comparing Investigation 3: Session 1-2 Turtle Paths Investigation 3: Session 1-2
· U.S. customary units; e.g., mile, square inch, cubic inch, second degree Fahrenheit, and other units as appropriate;	b. volume (capacity) – gallons;	Can be developed from Exploring Solids and Boxes Investigation 4: Session 1-3 Investigation 5: Session 1-4
· metric units; e.g., millimeter, kilometer, square centimeter, kilogram, cubic centimeter, degree Celsius, and other units as appropriate.	c. weight-ounces, pounds, grams, or kilograms;	Combining and Comparing Investigation 2: Session 1-2
	d. temperature – degrees (Fahrenheit or Celsius).	Can be developed from Up and Down Number Line Investigation 1: Sessions 1, 2, 8
	4. Read thermometers in both Fahrenheit and Celsius scales.	Related Content: Up and Down the Number Line Investigation 1: Sessions 1-2, 8

Number, Number Sense	Indicators	Investigations in Number, Data, & Space
B. Know that the number of units is inversely related to the size of the unit for any item being measured.		From Paces to Feet Investigation 1: Session 1-6 Investigation 2: Session 1-7 Investigation 3: Session 1-3 Investigation 4: Session 1-3 Combining and Comparing Investigation 2: Session 1-2 Investigation 3: Session 1-2 Turtle Paths Investigation 2: Session 5-6 Investigation 3: Session 1-2
C. Develop common referents for units of measure for length, weight, volume (capacity) and time to make comparisons and estimates.	2. Establish personal or common referents to include additional units; e.g., a gallon container of milk; a postage stamp is about a square inch.	From Paces to Feet Investigation 1: Session 1-6 Investigation 2: Session 1-7 Investigation 3: Session 1-3 Investigation 4: Session 1-3 Combining and Comparing Investigation 2: Session 1-2 Turtle Paths Investigation 2: Session 5-6 Investigation 3: Session 1-2



Number, Number Sense	Indicators	Investigations in Number, Data, & Space
(continued)	5. Estimate and measure length, weight and volume (capacity), using metric and U.S. customary units, accurate to the nearest or unit as appropriate.	From Paces to Feet Investigation 1: Session 1-6 Investigation 2: Session 1-7 Investigation 3: Session 1-3 Investigation 4: Session 1-3 Combining and Comparing Investigation 2: Session 1-2 Investigation 3: Session 1-2 Turtle Paths Investigation 2: Session 5-6
D. Identify appropriate tools and apply counting techniques for measuring side lengths, perimeter, and area of squares, rectangles, and simple irregular two-dimensional shapes, volume of rectangular prisms, and time and temperature.	4. Read thermometers in both Fahrenheit and Celsius scales.	Related Content: Up and Down the Number Line Investigation 1: Sessions 1-2, 8
	6. Use appropriate measurement tools and techniques to construct a figure or approximate an amount of specified length, weight or volume (capacity); e.g., construct a rectangle with length inches and width 3 inches, fill a measuring cup to the cup	From Paces to Feet Investigation 4: Session 1-3 Combining and Comparing Investigation 2: Session 1-2 Turtle Paths Investigation 2: Session 5-6 Ten-Minute Math: Lengths and Perimeters Exploring Solids and Boxes Investigation 4: Session 1-3 Investigation 5: Session 1-4
	7. Make estimates for perimeter, area and volume using links, tiles, cubes and other models.	Flips, Turns and Area Investigation 2: Session 1-5 Turtle Paths Ten-Minute Math: Lengths and Perimeters

Number, Number Sense	Indicators	Investigations in Number, Data, & Space
E. Tell time to the nearest minute.	3. Tell time to the nearest minute and find elapsed time using a calendar or a clock.	Combining and Comparing Investigation 3: Session 3 Investigation 5: Session 1-3

Geometry and Spatial Sense	Indicators	Investigations in Number, Data, & Space
A. Provide rationale for groupings and comparisons of two-dimensional figures and three-dimensional objects.	1. Analyze and describe properties of two-dimensional shapes and three-dimensional objects using terms such as vertex, edge, angle, side and face.	Flips, Turns and Area Investigation 2: Session 1-3 Exploring Solids and Boxes Investigation 1: Session 1-2 Investigation 2: Session 1-5 Investigation 3: Session 1-2 Turtle Paths Investigation 2: Session 1-4
B. Describe and identify points, lines and planes in the environment.		Turtle Paths Investigation 1: Session 1 Investigation 2: Session 1-3
C. Describe and identify intersecting, parallel and perpendicular lines or segments in the environment.		Can be developed from Turtle Paths Investigation 1: Session 1 Investigation 2: Session 1-3
D. Identify and draw right, obtuse, acute and straight angles.	2. Identify and describe the relative size of angles with respect to right angles as follows:	Turtle Paths Investigation 2: Session 1-4 Investigation 3: Session 1-2
	a. Use physical models, like straws, to make different sized angles by opening and closing the sides, not by changing the side lengths.	Turtle Paths Investigation 2: Session 1-4 Investigation 3: Session 1-2
	b. Identify, classify and draw right, acute, obtuse and straight angles.	Turtle Paths Investigation 2: Session 1-4 Investigation 3: Session 1-2

Geometry and Spatial Sense	Indicators	Investigations in Number, Data, & Space
E. Use attributes to describe, classify and sketch plane figures and build solid objects.	1. Analyze and describe properties of two-dimensional shapes and three-dimensional objects using terms such as vertex, edge, angle, side and face.	Flips, Turns and Area Investigation 2: Session 1-3 Exploring Solids and Boxes Investigation 1: Session 1-2 Investigation 2: Session 1-5 Investigation 3: Session 1-2 Turtle Paths Investigation 2: Session 1-4
	5. Build a three-dimensional model of an object composed of cubes; e.g., construct a model based on an illustration or actual object.	Exploring Solids and Boxes Investigation 5: Session 1-4
F. Develop definitions of classes of shapes.		Flips, Turns and Area Investigation 2: Session 1-3 Exploring Solids and Boxes Investigation 1: Session 1-2 Investigation 2: Session 1-5
G. Find and name locations in coordinate systems.	3. Find and name locations on a labeled grid or coordinate system; e.g., a map or graph.	Up and Down the Number Line Investigation 2: Session 1-4
H. Identify and describe line and rotational symmetry in two-dimensional shapes and designs.	4. Draw lines of symmetry to verify symmetrical two-dimensional shapes.	Mathematical Thinking at Grade 3 Investigation 2: Session 1
I. Describe, identify and model reflections, rotations and translations, using physical materials.		Mathematical Thinking at Grade 3 Investigation 2: Session 1 Flips, Turns and Area Investigation 1: Session 1-3 Investigation 2: Session 2-3

Geometry and Spatial Sense	Indicators	Investigations in Number, Data, & Space
J. Describe a motion or series of transformations that show two shapes are congruent.		Flips, Turns and Area Investigation 1: Sessions 1, 5 Investigation 2: Session 2-3

Patterns, Functions and Algebra	Indicators	Investigations in Number, Data, & Space
A. Analyze and extend patterns, and describe the rule in words.	1. Extend multiplicative and growing patterns, and describe the pattern or rule in words.	Mathematical Thinking at Grade 3 Investigation 1: Session 1-3 Things That Come in a Group Investigation 2: Session 1-6 Investigation 3: Session 3-4 Investigation 5: Session 1 Flips, Turns and Area Investigation 1: Session 1-3 Landmarks in the Hundreds Investigation 1: Sessions 1, 4-5
	2. Analyze and replicate arithmetic sequences with and without a calculator.	Mathematical Thinking at Grade 3 Investigation 1: Session 1-3 Investigation 2: Session 1 Things That Come in a Group Investigation 5: Session 1 Landmarks in the Hundreds Investigation 1: Sessions 1, 4-5 Fair Shares Investigation 2: Session 5-6

Patterns, Functions and Algebra	Indicators	Investigations in Number, Data, & Space
B. Use patterns to make predictions, identify relationships, and solve problems.	3. Use patterns to make predictions, identify relationships, and solve problems.	Mathematical Thinking at Grade 3 Investigation 1: Session 1-3 Things That Come in a Group Investigation 2: Session 1-6 Investigation 3: Session 3-4 Investigation 5: Session 1 Flips, Turns and Area Investigation 1: Session 1-3 Landmarks in the Hundreds Investigation 1: Sessions 1, 4-5 Fair Shares Investigation 2: Session 5-6
C. Write and solve open sentences and explain strategies.	5. Write, solve and explain simple mathematical statements, such as $7 + \Delta > 8$ or $\Delta + 8 = 10$	Things That Come in Groups Investigation 1: Session 3 Investigation 4: Session 1-4 Up and Down the Number Line Investigation 1: Session 6-7
	6. Express mathematical relationships as equations and inequalities.	Mathematical Thinking at Grade 3 Investigation 3: Session 3-4 Fair Shares Investigation 2: Session 1-4 Investigation 3: Session 1-2 Combining and Comparing Investigation 1: Session 1-3 Investigation 3: Session 1-2 Investigation 4: Session 1-2

Patterns, Functions and Algebra	Indicators	Investigations in Number, Data, & Space
D. Represent an unknown quantity as a variable using a symbol, including letters.		Things That Come in Groups Investigation 1: Session 3 Investigation 4: Session 1-4 Up and Down the Number Line Investigation 1: Session 6-7
E. Use variables to create and solve equations representing problem situations.	4. Model problem situations using objects, pictures, tables, numbers, letters and other symbols.	Mathematical Thinking at Grade 3 Investigation 3: Session 3-4 Things That Come in Groups Investigation 1: Session 3 Investigation 4: Session 1-4 Up and Down the Number Line Investigation 1: Session 6-7 Combining and Comparing Investigation 1: Session 1-3 Investigation 3: Session 1-2 Investigation 4: Session 1-2 Fair Shares Investigation 2: Session 1-4 Investigation 3: Session 1-2
F. Construct and use a table of values to solve problems associated with mathematical relationships.	7. Create tables to record, organize and analyze data to discover patterns and rules.	Things That Come in Groups Investigation 5: Session 1-4 Fair Shares Investigation 2: Session 5-6
G. Describe how a change in one variable affects the value of a related variable.	8. Identify and describe quantitative changes, especially those involving addition and subtraction; e.g., the height of water in a glass becoming 1 centimeter lower each week due to evaporation.	Can be developed from Things That Come in Groups Investigation 5: Session 1-4 Fair Shares Investigation 2: Session 5-6



<b>Data Analysis &amp; Probability</b>	<b>Indicators</b>	<b>Investigations in Number, Data, &amp; Space</b>
A. Gather and organize data from surveys and classroom experiments, including data collected over a period of time.	1. Collect and organize data from an experiment, such as recording and classifying observations or measurements, in response to a question posed.	Mathematical Thinking at Grade 3 Investigation 3: Session 1-2 From Paces to Feet Investigation 2: Session 2 Investigation 3: Session 1-3
B. Read and interpret tables, charts, graphs (bar, picture, line, line plot), and timelines as sources of information, identify main idea, draw conclusions, and make predictions.	4. Support a conclusion or prediction orally and in writing, using information in a table or graph.	Mathematical Thinking at Grade 3 Investigation 3: Session 1-4 Things That Come in Groups Investigation 1: Session 1 Investigation 5: Session 1-4 From Paces to Feet Investigation 2: Session 2 Investigation 3: Session 2-3 Landmarks in the Hundreds Investigation 1: Session 6-7 Up and Down the Number Line Investigation 1: Session 1-2 Combining and Comparing Investigation 1: Session 3 Investigation 4: Session 1 Fair Shares Investigation 2: Session 5-6

Data Analysis & Probability	Indicators	Investigations in Number, Data, & Space
(continued)	5. Match a set of data with a graphical representation of the data.	Mathematical Thinking at Grade 3 Investigation 3: Session 1-4 Things That Come in Groups Investigation 5: Session 3 From Paces to Feet Investigation 1: Sessions 1-2, 5-6 Investigation 2: Session 2 Combining and Comparing
	7. Analyze and interpret information represented on a timeline.	Can be developed from Combining and Comparing Investigation 5: Session 1-3
C. Construct charts, tables and graphs to represent data, including picture graphs, bar graphs, line graphs, line plots and simple Venn diagrams.	6. Translate information freely among charts, tables, line plots, picture graphs and bar graphs; e.g., create a bar graph from the information in a chart.	Mathematical Thinking at Grade 3 Investigation 3: Session 1-4 Things That Come in Groups Investigation 1: Session 1 Investigation 5: Session 1-4 From Paces to Feet Investigation 2: Session 2 Investigation 3: Session 2-3 Landmarks in the Hundreds Investigation 1: Session 6-7 Up and Down the Number Line Investigation 1: Session 1-2 Combining and Comparing Investigation 1: Session 3 Investigation 4: Session 1 Fair Shares Investigation 2: Session 5-6

<b>Data Analysis &amp; Probability</b>	<b>Indicators</b>	<b>Investigations in Number, Data, &amp; Space</b>
D. Read, interpret and construct graphs in which icons represent more than a single unit or intervals greater than one; e.g., each b = 10 bicycles or the intervals on an axis are multiples of 10.	2. Draw and interpret picture graphs in which a symbol or picture represents more than one object.	Mathematical Thinking at Grade 3 Investigation 3: Session 1-2
	3. Read, interpret and construct bar graphs with intervals greater than one.	Mathematical Thinking at Grade 3 Investigation 3: Session 1-2
E. Describe data using mode, median and range.	8. Identify the mode of a data set and describe the information it gives about a data set.	Can be developed from Mathematical Thinking at Grade 3 Investigation 3: Session 1-4 Things That Come in Groups Investigation 1: Session 1 Investigation 5: Session 1-4 From Paces to Feet Investigation 2: Session 2 Investigation 3: Session 2-3 Combining and Comparing Investigation 1: Session 3 Investigation 4: Session 1
F. Conduct a simple probability experiment and draw conclusions about the likelihood of possible outcomes.	9. Conduct a simple experiment or simulation of a simple event, record the results in a chart, table or graph, and use the results to draw conclusions about the likelihood of possible outcomes.	Things That Come in Groups Ten-Minute Math: Likely or Unlikely? Exploring Solids and Boxes Ten-Minute Math: What is Likely?

<b>Data Analysis &amp; Probability</b>	<b>Indicators</b>	<b>Investigations in Number, Data, &amp; Space</b>
G. Identify and represent possible outcomes, such as arrangements of a set of up to four members and possible combinations from several sets, each containing 2 or 3 members.	10. Use physical models, pictures, diagrams and lists to solve problems involving possible arrangements or combinations of two to four objects.	Things That Come in Groups Ten-Minute Math: Likely or Unlikely? Exploring Solids and Boxes Ten-Minute Math: What is Likely?
H. Use the set of possible outcomes to describe and predict events.		Things That Come in Groups Ten-Minute Math: Likely or Unlikely? Exploring Solids and Boxes Ten-Minute Math: What is Likely?

**Investigations in Number, Data, & Space  
Cincinnati Pacing Guide  
Grade Four**

Number, Number Sense	Indicators	Investigations in Number, Data, & Space
<p>A. Use place value structure of the base-ten number system to read, write, represent and compare whole numbers and decimals.</p>	<p>2. Use place value structure of the base-ten number system to read, write, represent and compare whole numbers through millions and decimals through thousandths.</p>	<p>Mathematical Thinking at Grade 4 Investigation 1: Session 1-3 Arrays and Shares Investigation 1: Session 1-2 Landmarks in the Thousands Investigation 4: Session 1-3</p>
	<p>3. Round whole numbers to a given place value.</p>	<p>Mathematical Thinking at Grade 4 Investigation 1: Session 2-4 Investigation 2: Session 3-4 Ten-Minute Math: Estimation and Number Sense Landmarks in the Thousands Investigation 3: Session 3-5 The Shape of the Data Ten-Minute Math: Estimation and Number Sense Packages and Groups Investigation 2: Session 2-3 Money, Miles, and Large Numbers Investigation 1: Sessions 1-2, 7-8 Investigation 2: Session 1-2 Investigation 3: Session1</p>

Number, Number Sense	Indicators	Investigations in Number, Data, & Space
<p>B. Recognize and generate equivalent representations for whole numbers, fractions and decimals.</p>	<p>1. Identify and generate equivalent forms of fractions and decimals. For example:</p> <p>a. Connect physical, verbal and symbolic representations of fractions, decimals and whole numbers; e.g., <math>\frac{1}{2}</math>, <math>\frac{5}{10}</math> “five tenths,” 0.5, shaded rectangles with half, and five tenths.</p>	<p>Different Shapes, Equal Pieces            Investigation 1: Session 1-5            Investigation 2: Session 1-4            Investigation 3: Session 1-5            Money, Miles, and Large Numbers            Investigation 1: Sessions 1-2, 4-8            Investigation 2: Session 1-4            Sunken Ships and Grid Patterns            Investigation 2: Session 5            Three Out of Four Like Spaghetti            Investigation 1: Session 1-4</p>
	<p>b. Understand and explain that ten tenths is the same as one whole in both fraction and decimal form.</p>	<p>Different Shapes, Equal Pieces            Investigation 1: Session 1-5            Investigation 2: Session 1-4            Investigation 3: Session 1-5            Money, Miles, and Large Numbers            Investigation 1: Sessions 1-2, 4-8            Investigation 2: Session 1-4            Sunken Ships and Grid Patterns            Investigation 2: Session 5            Three Out of Four Like Spaghetti            Investigation 1: Session 1-4</p>

Number, Number Sense	Indicators	Investigations in Number, Data, & Space
C. Represent commonly used fractions and mixed numbers using words and physical models.		Different Shapes, Equal Pieces Investigation 1: Session 1-5 Investigation 2: Session 1-4 Investigation 3: Session 1-5 Money, Miles, and Large Numbers Investigation 1: Sessions 1-2, 4-8 Investigation 2: Session 1-4 Sunken Ships and Grid Patterns Investigation 2: Session 5 Three Out of Four Like Spaghetti Investigation 1: Session 1-4
D. Use models, points of reference and equivalent forms of commonly used fractions to judge the size of fractions and to compare, describe and order them.	5. Use models and points of reference to compare commonly used fractions.	Different Shapes, Equal Pieces Investigation 1: Session 5 Investigation 2: Session 1-4 Investigation 3: Session 3-5 Three Out of Four Like Spaghetti Investigation 1: Session 2-4
E. Recognize and classify numbers as prime or composite and list factors.	4. Identify and represent factors and multiples of whole numbers through 100, and classify numbers as prime or composite.	Mathematical Thinking at Grade 4 Investigation 1: Session 1-6 Arrays and Shares Investigation 2: Sessions 2-3, 5-6 Landmarks in the Thousands Investigation 1: Session 1-2 Investigation 2: Session 1-5 Packages and Groups Investigation 3: Session 4-10

Number, Number Sense	Indicators	Investigations in Number, Data, & Space
F. Count money and make change using both coins and paper bills.	8. Solve problems involving counting money and making change, using both coins and paper bills.	Money, Miles, and Large Numbers Investigation 1: Session 1-8
G. Model and use commutative and associative properties for addition and multiplication.		Can be developed from Mathematical Thinking at Grade 4 Investigation 2: Session 1-4 Investigation 3: Session 3-5 Arrays and Shares Investigation 2: Session 1-8 Investigation 3: Session 2-4 Landmarks in the Thousands Investigation 1: Session 3 Investigation 2: Session 2-4 Packages and Groups Investigation 2: Session 1-3 Investigation 3: Sessions 1-2, 4-6



Number, Number Sense	Indicators	Investigations in Number, Data, & Space
H. Use relationships between operations, such as subtraction as the inverse of addition and division as the inverse of multiplication.		Mathematical Thinking at Grade 4 Investigation 2: Session 1-4 Investigation 3: Session 1-5 Arrays and Shares Investigation 1: Session 1-3 Investigation 2: Session 1-8 Investigation 3: Session 1-5 Landmarks in the Thousands Investigation 1: Session 3 Investigation 2: Session 2-4 Investigation 3 Session 2-5 Investigation 4 Session 1-3 Packages and Groups Investigation 2: Session 1-3 Investigation 3: Session 1-9
I. Demonstrate fluency in multiplication facts with factors through 10 and corresponding divisions	14. Demonstrate fluency in adding and subtracting whole numbers and in multiplying and dividing whole numbers by 1- and 2-digit numbers and multiples of ten.	Mathematical Thinking at Grade 4 Investigation 2: Session 1-4 Investigation 3: Session 1-5 Arrays and Shares Investigation 1: Session 1-3 Investigation 2: Session 1-8 Investigation 3: Session 1-5 Landmarks in the Thousands Investigation 1: Session 3 Investigation 2: Session 2-4 Investigation 3 Session 2-5 Investigation 4 Session 1-3 Packages and Groups Investigation 2: Session 1-3 Investigation 3: Session 1-9

Number, Number Sense	Indicators	Investigations in Number, Data, & Space
<p>J. Estimate the results of whole number computations using a variety of strategies, and judge the reasonableness.</p>	<p>9. Estimate the results of computations involving whole numbers, fractions and decimals, using a variety of strategies.</p>	<p>Mathematical Thinking at Grade 4 Investigation 1 Session 4 Ten-Minute Math: Estimation and Number Sense Landmarks in the Thousands Investigation 1: Session 3 Investigation 2: Session 2-4 Investigation 3 Session 2-5 Investigation 4 Session 1-3 Money, Miles, and Large Numbers Investigation 1: Sessions 1-5 7-8 Investigation 2 Session 1-3 Investigation 3 Session 1-4</p>
<p>K. Analyze and solve multi-step problems involving addition, subtraction, multiplication and division using whole numbers.</p>	<p>8. <i>Use geometric models to solve problems in other areas of mathematics, such as number (multiplication/division) and measurement (area, perimeter, border).</i></p>	<p>Sunken Ships and Grid Patterns Ten-Minute Math: Lengths and Perimeters Different Shapes, Equal Pieces Investigation 1: Session 1-4 Investigation 2 Session 1-2</p>

Number, Number Sense	Indicators	Investigations in Number, Data, & Space
(continued)	6. Use associative and distributive properties to simplify and perform computations; e.g., use left to right multiplication and the distributive property to find an exact answer without paper and pencil, such as: $5 \times 47 = 5 \times 40 + 5 \times 7 = 200 + 35 = 235$ .	Mathematical Thinking at Grade 4 Investigation 2: Session 1-4 Investigation 3: Session 3-5 Arrays and Shares Investigation 2: Session 1-8 Investigation 3: Session 2-4 Landmarks in the Thousands Investigation 1: Session 3 Investigation 2: Session 2-4 Packages and Groups Investigation 2: Session 1-3 Investigation 3: Sessions 1-2, 4-6
	7. Recognize that division may be used to solve different types of problem situations and interpret the meaning of remainders; e.g., situations involving measurement, money.	Arrays and Shares Investigation 1: Session 3 Investigation 2: Session 5-8 Investigation 3: Session 2-4 Packages and Groups Investigation 3: Session 1-9
	12. Analyze and solve multi-step problems involving addition, subtraction, multiplication and division using an organized approach, and verify and interpret results with respect to the original problem.	Arrays and Shares Investigation 2: Session 1-8 Investigation 3: Session 2-4 Landmarks in the Thousands Investigation 1: Session 2 Packages and Groups Investigation 2: Session 1-3 Investigation 3: Sessions 8, 10 Ten-Minute Math: Guess My Number

Number, Number Sense	Indicators	Investigations in Number, Data, & Space
L. Use a variety of methods and appropriate tools (mental math, paper and pencil, calculators) for computing with whole numbers.	11. Develop and explain strategies for performing computations mentally.	Mathematical Thinking at Grade 4 Investigation 1: Session 4 Ten-Minute Math: Estimation and Number Sense Landmarks in the Thousands Investigation 1: Session 1-3 Investigation 2: Session 1-5 Investigation 3: Session 2-5 Investigation 4: Session 1-3 Money, Miles and Large Numbers Investigation 1: Sessions 1-5, 7-8 Investigation 2: Session 1-3 Investigation 3: Session 1-4 Packages and Groups Investigation 1: Session 1-5 Investigation 2: Session 1-3 Investigation 3: Session 1-10

Number, Number Sense	Indicators	Investigations in Number, Data, & Space
(continued)	13. Use a variety of methods and appropriate tools for computing with whole numbers; e.g., mental math, paper and pencil, and calculator.	Mathematical Thinking at Grade 4 Investigation 1: Session 4 Investigation 2: Session 1-4 Investigation 3: Session 3-5 Arrays and Shares Investigation 1: Session 1-3 Investigation 2: Session 1-8 Investigation 3: Session 1-5 Landmarks in the Thousands Investigation 1: Session 3 Investigation 2: Session 2-4 Investigation 3: Session 3-5 Investigation 4: Session 1-3 Money, Miles and Large Numbers Investigation 1: Sessions 1-5, 7-8 Investigation 2: Session 1-3 Investigation 3: Session 1-4 Packages and Groups Investigation 1: Session 1-5 Investigation 3: Session 1-10

Number, Number Sense	Indicators	Investigations in Number, Data, & Space
(continued)	14. Demonstrate fluency in adding and subtracting whole numbers and in multiplying and dividing whole numbers by 1- and 2-digit numbers and multiples of ten.	Mathematical Thinking at Grade 4 Investigation 1: Session 4 Investigation 2: Session 1-4 Investigation 3: Session 3-5 Arrays and Shares Investigation 1: Session 1-3 Investigation 2: Session 1-8 Investigation 3: Session 1-5 Landmarks in the Thousands Investigation 1: Session 3 Investigation 2: Session 2-4 Investigation 3: Session 3-5 Investigation 4: Session 1-3 Money, Miles and Large Numbers Investigation 1: Sessions 1-5, 7-8 Investigation 2: Session 1-3 Investigation 3: Session 1-4 Packages and Groups Investigation 1: Session 1-5 Investigation 3: Session 1-10

Number, Number Sense	Indicators	Investigations in Number, Data, & Space
M. Add and subtract commonly used fractions with like denominators and decimals, using models and paper and pencil.	9. Estimate the results of computations involving whole numbers, fractions and decimals, using a variety of strategies.	Mathematical Thinking at Grade 4 Investigation 1: Session 4 Arrays and Shares Investigation 1: Session 1-3 Investigation 2: Session 1-8 Landmarks in the Thousands Investigation 1: Session 1-3 Investigation 2: Session 1-5 Investigation 3: Session 7-5 Money, Miles and Large Numbers Investigation 1: Sessions 1-5, 7-8 Investigation 2: Session 1-3
	10. Use physical models, visual representations, and paper and pencil to add and subtract decimals and commonly used fractions with like denominators.	Different Shapes, Equal Pieces Investigation 1: Session 1-8 Investigation 2: Sessions 1-2, 4

Measurement Standard	Indicators	Investigations in Number, Data, & Space
<p>A. Select appropriate units for perimeter, area, weight, volume (capacity), time and temperature using:</p> <ul style="list-style-type: none"> <li>• U.S. customary units; e.g., mile, square inch, cubic inch, second degree Fahrenheit, and other units as appropriate;</li> <li>• metric units; e.g., millimeter, kilometer, square centimeter, kilogram, cubic centimeter, degree Celsius, and other units as appropriate.</li> </ul>	<p>3. Identify and select appropriate units to measure:</p> <p>a. perimeter – string or links (inches or centimeters).</p>	<p>Sunken Ships and Grid Patterns Ten-Minute Math: Lengths and Perimeters</p>
	<p>b. area – tiles (square inches or square centimeters).</p>	<p>Different Shapes, Equal Pieces Investigation 1: Session 1-4 Investigation 2: Session 1-2</p>
	<p>c. Volume – cubes (cubic inches or cubic centimeters).</p>	<p>Seeing Solids and Silhouettes Investigation 1: Session 1</p>
<p>B. Know that the number of units is inversely related to the size of the unit for any item being measured.</p>	<p>1. Relate the number of units to the size of the units used to measure an object; e.g., compare the number of cups to fill a pitcher to the number of quarts to fill the same pitcher.</p>	<p>The Shape of the Data Investigation 2: Session 4 Money, Miles, and Large Numbers Investigation 2: Session 3-4 Investigation 3: Session 2-4</p>
<p>C. Develop common referents for units of measure for length, weight, volume (capacity) and time to make comparisons and estimates.</p>	<p>2. Demonstrate and describe perimeter as surrounding and area as covering a two-dimensional shape, and volume as filling a three-dimensional object.</p>	<p>Seeing Solids and Silhouettes Investigation 1: Session 1 Different Shapes, Equal Pieces Investigation 1: Session 1-4 Investigation 2: Session 1-2 Sunken Ships and Grid Patterns Ten-Minute Math: Lengths and Perimeters</p>



Measurement Standard	Indicators	Investigations in Number, Data, & Space
D. Identify appropriate tools and apply counting techniques for measuring side lengths, perimeter, and area of squares, rectangles, and simple irregular two-dimensional shapes, volume of rectangular prisms, and time and temperature.	4. Develop and use strategies to find perimeter using string or links, area using tiles or a grid, and volume using cubes; e.g., count squares to find area of regular or irregular shapes on a grid, layer cubes in a box to find its volume.	Seeing Solids and Silhouettes Investigation 1: Session 1 Different Shapes, Equal Pieces Investigation 1: Session 1-4 Investigation 2: Session 1-2 Sunken Ships and Grid Patterns Ten-Minute Math: Lengths and Perimeters
E. Tell time to the nearest minute.	<i>Note: There are instances where a grade-level indicator is linked to a benchmark for a grade band that does not include the grade level of the indicator. See Grade 5 for indicator 5 and Grade 5 for indicator 6.</i>	Can be developed from Changes Over Time Investigation 1: Session 1-2 Investigation 2: Session 1-2

<b>Geometry and Spatial Sense</b>	<b>Indicators</b>	<b>Investigations in Number, Data, &amp; Space</b>
A. Provide rationale for groupings and comparisons of two-dimensional figures and three-dimensional objects.	3. Identify similarities and differences of quadrilaterals; e.g., squares, rectangles, parallelograms and trapezoids.	Seeing Solids and Silhouettes Ten-Minute Math: Quick Images Different Shapes, Equal Pieces Investigation 1: Session 2-4 Investigation 2: Session 1-4 Investigation 3: Session 1-2 Sunken Ships and Grid Patterns Investigation 1: Session 3-4 Investigation 2: Session 1-9 Ten-Minute Math: Lengths and Perimeters
	4. Identify and define triangles based on angle measures (equiangular, right, acute and obtuse triangles) and side lengths (isosceles, equilateral and scalene triangles).	Can be developed from Sunken Ships and Grid Patterns Investigation 1: Session 3-4 Investigation 2: Session 1-9
B. Describe and identify points, lines and planes in the environment.	5. Describe points, lines and planes, and identify models in the environment.	Sunken Ships and Grid Patterns Investigation 1: Session 1-7
C. Describe and identify intersecting, parallel and perpendicular lines or segments in the environment.	1. Identify, describe and model intersecting, parallel and perpendicular lines and line segments; e.g., use straws or other material to model lines.	Sunken Ships and Grid Patterns Investigation 1: Session 1-7
D. Identify and draw right, obtuse, acute and straight angles.		Sunken Ships and Grid Patterns Investigation 1: Session 3-4 Investigation 2: Session 1-9

Geometry and Spatial Sense	Indicators	Investigations in Number, Data, & Space
E. Use attributes to describe, classify and sketch plane figures and build solid objects.	2. Describe, classify, compare and model two- and three-dimensional objects using their attributes.	Seeing Solids and Silhouettes Investigation 1: Session 1-4 Investigation 2: Session 2-4 Different Shapes, Equal Pieces Investigation 1: Session 2-4 Investigation 2: Session 1-4 Investigation 3: Session 1-2 Sunken Ships and Grid Patterns Investigation 1: Session 3-4 Investigation 2: Session 1-9
F. Develop definitions of classes of shapes.	3. Identify similarities and differences of quadrilaterals; e.g., squares, rectangles, parallelograms and trapezoids.	Sunken Ships and Grid Patterns Investigation 1: Session 3-4 Investigation 2: Session 1-9
	4. Identify and define triangles based on angle measures (equiangular, right, acute and obtuse triangles) and side lengths (isosceles, equilateral and scalene triangles).	Can be developed from Sunken Ships and Grid Patterns Investigation 1: Session 3-4 Investigation 2: Session 1-9
G. Find and name locations in coordinate systems.	6. Specify locations and plot ordered pairs on a coordinate plane, using first quadrant points.	Sunken Ships and Grid Patterns Investigation 1: Session 1-6 Investigation 2: Session 1-9
H. Identify and describe line and rotational symmetry in two-dimensional shapes and designs.		Mathematical Thinking at Grade 4 Investigation 4: Session 1-6 Sunken Ships and Grid Patterns Investigation 2: Session 1-9

Geometry and Spatial Sense	Indicators	Investigations in Number, Data, & Space
I. Describe, identify and model reflections, rotations and translations, using physical materials.	7. Identify, describe and use reflections (flips), rotations (turns), and translations (slides) in solving geometric problems; e.g., use transformations to determine if 2 shapes are congruent.	Mathematical Thinking at Grade 4 Investigation 4: Session 1-6 Sunken Ships and Grid Patterns Investigation 2: Session 1-9
J. Describe a motion or series of transformations that show two shapes are congruent.	7. Identify, describe and use reflections (flips), rotations (turns), and translations (slides) in solving geometric problems; e.g., use transformations to determine if 2 shapes are congruent.	Mathematical Thinking at Grade 4 Investigation 4: Session 1-6 Sunken Ships and Grid Patterns Investigation 2: Session 1-9
	<i>Note: There are instances when a grade-level indicator for one standard is linked to a benchmark for a different standard. See correlations for <b>Number, Number Sense and Operations and Measurement</b> for indicator 8.</i>	Sunken Ships and Grid Patterns Ten-Minute Math: Lengths and Perimeters Different Shapes, Equal Pieces Investigation 1: Session 1-4 Investigation 2: Session 1-2

Patterns, Functions and Algebra	Indicators	Investigations in Number, Data, & Space
A. Analyze and extend patterns, and describe the rule in words.	2. Represent and analyze patterns and functions using words, tables and graphs.	Mathematical Thinking at Grade 4 Investigation 3: Session 1-2 Arrays and Shares Investigation 1: Session 1-3 Investigation 2: Session 1-6 Investigation 3: Session 1 Landmarks in the Thousands Investigation 1: Session 1-2 Investigation 2: Session 1-4 Packages and Groups Investigation 1: Session 1-2 Investigation 3: Session 4-6
B. Use patterns to make predictions, identify relationships, and solve problems.	1. Use models and words to describe, extend and make generalizations of patterns and relationships occurring in computation, numerical patterns, geometry, graphs and other applications.	Mathematical Thinking at Grade 4 Investigation 3: Session 1-2 Arrays and Shares Investigation 1: Session 1-3 Investigation 2: Session 1-6 Investigation 3: Session 1 Landmarks in the Thousands Investigation 1: Session 1-2 Investigation 2: Session 1-4 Packages and Groups Investigation 1: Session 1-2 Investigation 3: Session 4-6

Patterns, Functions and Algebra	Indicators	Investigations in Number, Data, & Space
C. Write and solve open sentences and explain strategies.	5. Represent mathematical relationships with equations or inequalities.	Mathematical Thinking at Grade 4 Investigation 3: Session 1-2 Arrays and Shares Investigation 2: Session 2-3 Seeing Solids Investigation 1: Session 1 Landmarks in the Thousands Investigation 1: Session 2-4 The Shape of the Data Investigation 2: Session 2-3 Money, Miles, and Large Numbers Investigation 1: Session 7-8
D. Represent an unknown quantity as a variable using a symbol, including letters.	1. Represent and analyze patterns and functions using words, tables and graphs.	Mathematical Thinking at Grade 4 Investigation 3: Session 1-2 Arrays and Shares Investigation 1: Session 1-3 Investigation 2: Session 1-6 Investigation 3: Session 1 Landmarks in the Thousands Investigation 1: Session 1-2 Investigation 2: Session 1-4 Packages and Groups Investigation 1: Session 1-2 Investigation 3: Session 4-6

Patterns, Functions and Algebra	Indicators	Investigations in Number, Data, & Space
E. Use variables to create and solve equations representing problem situations.	4. Use rules and variables to describe patterns and other relationships.	Mathematical Thinking at Grade 4 Investigation 3: Session 1-2 Arrays and Shares Investigation 1: Session 1-3 Investigation 2: Session 1-6 Investigation 3: Session 1 Landmarks in the Thousands Investigation 1: Session 1-2 Investigation 2: Session 1-4 Packages and Groups Investigation 1: Session 1-2 Investigation 3: Session 4-6
F. Construct and use a table of values to solve problems associated with mathematical relationships.	3. Construct a table of values to solve problems associated with a mathematical relationship.	Arrays and Shares Investigation 2: Session 1-4 Ten-Minute Math: Multiple Bingo Landmarks in the Thousands Investigation 2: Session 1 Packages and Groups Investigation 2: Session 1
G. Describe how a change in one variable affects the value of a related variable.	6. Describe how a change in one variable affects the value of a related variable; e.g., as one increases the other increases or as one increases the other decreases.	Arrays and Shares Investigation 2: Session 1-4 Ten-Minute Math: Multiple Bingo Landmarks in the Thousands Investigation 2: Session 1 Packages and Groups Investigation 2: Session 1

Data Analysis & Probability	Indicators	Investigations in Number, Data, & Space
A. Gather and organize data from surveys and classroom experiments, including data collected over a period of time.	1. Create a plan for collecting data for a specific purpose.	The Shape of the Data Investigation 1: Session 2-3 Investigation 3: Session 1-5 Three Out of Four Like Spaghetti Investigation 2: Session 1-7
B. Read and interpret tables, charts, graphs (bar, picture, line, line plot), and timelines as sources of information, identify main idea, draw conclusions, and make predictions.	2. Represent and interpret data using tables, bar graphs, line plots and line graphs.	The Shape of the Data Investigation 1: Session 1-3 Investigation 2: Session 2-7 Investigation 3: Session 3-5 Changes Over Time Investigation 1: Session 1-4 Investigation 3: Session 1-8 Three Out of Four Like Spaghetti Investigation 1: Sessions 1-2, 5-7
	5. Propose and explain interpretations and predictions based on data displayed in tables, charts and graphs.	The Shape of the Data Investigation 1: Session 1-3 Investigation 2: Session 2-7 Investigation 3: Session 3-5 Changes Over Time Investigation 1: Session 1-4 Investigation 3: Session 1-8 Three Out of Four Like Spaghetti Investigation 1: Sessions 1-2, 5-7



<b>Data Analysis &amp; Probability</b>	<b>Indicators</b>	<b>Investigations in Number, Data, &amp; Space</b>
C. Construct charts, tables and graphs to represent data, including picture graphs, bar graphs, line graphs, line plots and simple Venn diagrams.	2. Represent and interpret data using tables, bar graphs, line plots and line graphs.	The Shape of the Data Investigation 1: Session 1-3 Investigation 2: Session 2-7 Investigation 3: Session 3-5 Changes Over Time Investigation 1: Session 1-4 Investigation 3: Session 1-8 Three Out of Four Like Spaghetti Investigation 1: Sessions 1-2, 5-7
	3. Interpret and construct Venn diagrams to sort and describe data.	Can be developed from The Shape of the Data Investigation 1: Session 1-3 Investigation 2: Session 2-7 Investigation 3: Session 3-5 Changes Over Time Investigation 1: Session 1-4 Investigation 3: Session 1-8 Three Out of Four Like Spaghetti Investigation 1: Sessions 1-2, 5-7
	4. Compare different representations of the same data to evaluate how well each representation shows important aspects of the data, and identify appropriate ways to display the data.	The Shape of the Data Investigation 1: Session 1-3 Investigation 2: Session 2-7 Investigation 3: Session 3-5 Changes Over Time Investigation 1: Session 1-4 Investigation 3: Session 1-8 Three Out of Four Like Spaghetti Investigation 1: Sessions 1-2, 5-7

Data Analysis & Probability	Indicators	Investigations in Number, Data, & Space
D. Read, interpret and construct graphs in which icons represent more than a single unit or intervals greater than one; e.g., each □ = 10 bicycles or the intervals on an axis are multiples of 10.		The Shape of the Data Investigation 1: Session 1-3 Investigation 2: Session 2-7 Investigation 3: Session 3-5 Changes Over Time Investigation 1: Session 1-4 Investigation 3: Session 1-8 Three Out of Four Like Spaghetti Investigation 1: Sessions 1-2, 5-7
E. Describe data using mode, median and range.	6. Describe the characteristics of a set of data based on a graphical representation, such as range of the data, clumps of data, and holes in the data.	The Shape of the Data Investigation 2: Session 4-7
	7. Identify the median of a set of data and describe what it indicates about the data.	The Shape of the Data Investigation 2: Session 4-7
	8. Use range, median and mode to make comparisons among related sets of data.	The Shape of the Data Investigation 2: Session 4-7

Data Analysis & Probability	Indicators	Investigations in Number, Data, & Space
<p>F. Conduct a simple probability experiment and draw conclusions about the likelihood of possible outcomes.</p>	<p>9. Conduct simple probability experiments and draw conclusions from the results; e.g., rolling number cubes or drawing marbles from a bag.</p>	<p>Landmarks in the Thousands            Ten-Minute Math: What is Likely?            Money, Miles, and Large Numbers            Ten-Minute Math: What is Likely?            Three Out of Four Like Spaghetti            Investigation 1: Session 3            Investigation 2: Session 2            Ten-Minute Math: What is Likely?</p>
	<p>10. Represent the likelihood of possible outcomes for chance situations; e.g., probability of selecting a red marble from a bag containing 3 red and 5 white marbles.</p>	<p>Landmarks in the Thousands            Ten-Minute Math: What is Likely?            Money, Miles, and Large Numbers            Ten-Minute Math: What is Likely?            Three Out of Four Like Spaghetti            Investigation 1: Session 3            Investigation 2: Session 2            Ten-Minute Math: What is Likely?</p>
	<p>11. Relate the concepts of impossible and certain-to-happen events to the numerical values of 0 (impossible) and 1 (certain).</p>	<p>Landmarks in the Thousands            Ten-Minute Math: What is Likely?            Money, Miles, and Large Numbers            Ten-Minute Math: What is Likely?            Three Out of Four Like Spaghetti            Investigation 1: Session 3            Investigation 2: Session 2            Ten-Minute Math: What is Likely?</p>

Data Analysis & Probability	Indicators	Investigations in Number, Data, & Space
(continued)	12. Place events in order of likelihood and use a diagram or appropriate language to compare the chance of each event occurring; e.g. impossible, unlikely, equal, likely, certain.	Landmarks in the Thousands Ten-Minute Math: What is Likely? Money, Miles, and Large Numbers Ten-Minute Math: What is Likely? Three Out of Four Like Spaghetti Investigation 1: Session 3 Investigation 2: Session 2 Ten-Minute Math: What is Likely?
G. Identify and represent possible outcomes, such as arrangements of a set of up to four members and possible combinations from several sets, each containing 2 or 3 members.	13. List and count all possible combinations using one member from each of several sets, each containing 2 or 3 members; e.g., the number of possible outfits from 3 shirts, 2 shorts, and 2 pairs of shoes.	Arrays and Shares Investigation 2: Session 1-6 Landmarks in the Thousands Investigation 1: Session 2 Different Shapes, Equal Pieces Investigation 1: Sessions 1, 5 Investigation 2: Session 3-4
H. Use the set of possible outcomes to describe and predict events.	10. Represent the likelihood of possible outcomes for chance situations; e.g., probability of selecting a red marble from a bag containing 3 red and 5 white marbles.	Landmarks in the Thousands Ten-Minute Math: What is Likely? Money, Miles, and Large Numbers Ten-Minute Math: What is Likely? Three Out of Four Like Spaghetti Investigation 1: Session 3 Investigation 2: Session 2 Ten-Minute Math: What is Likely?

<b>Data Analysis &amp; Probability</b>	<b>Indicators</b>	<b>Investigations in Number, Data, &amp; Space</b>
(continued)	11. Relate the concepts of impossible and certain-to-happen events to the numerical values of 0 (impossible) and 1 (certain).	Landmarks in the Thousands Ten-Minute Math: What is Likely? Money, Miles, and Large Numbers Ten-Minute Math: What is Likely? Three Out of Four Like Spaghetti Investigation 1: Session 3 Investigation 2: Session 2 Ten-Minute Math: What is Likely?

**Investigations in Number, Data, & Space  
Cincinnati Pacing Guide  
Grade Five**

Number, Number Sense	Indicators	Investigations in Number, Data, & Space
A. Represent and compare numbers less than 0 through familiar applications and extending the number line.	6. Represent and compare numbers less than 0 by extending the number line and using familiar applications; e.g., temperature, owing money.	Mathematical Thinking at Grade 5 Investigation 4: Session 1: Teacher Note, 79 Picturing Polygons Investigation 1: Session 3-4 Investigation 2: Session 4-5
B. Compare, order and convert among fractions, decimals and percents.	1. Use models and visual representations to develop the concept of ratio as part-to-part and part-to-whole, and the concept of percent as part-to-whole.	Name That Portion Investigation 1: Session 1-7 Investigation 2: Session 1-9 Investigation 3: Session 3-8 Investigation 4: Session 1-4
	2. Use various forms of “one” to demonstrate the equivalence of fractions; e.g., $18/24=9/12 \times 2/2=3/4 \times 6/6$	Name That Portion Investigation 1: Session 1-7 Investigation 2: Session 1-9 Investigation 3: Session 3-8
	3. Identify and generate equivalent forms of fractions, decimals and percents.	Name That Portion Investigation 1: Session 1-7 Investigation 2: Session 1-9 Investigation 3: Session 3-8
C. Develop meaning for percents including percents greater than 100 and less than 1.		Name That Portion Investigation 1: Session 1-7 Investigation 2: Session 1-9 Investigation 3: Session 3-8 Investigation 4: Session 1-4

Number, Number Sense	Indicators	Investigations in Number, Data, & Space
D. Use models and pictures to relate concepts of ratio, proportion and percent.	1. Use models and visual representations to develop the concept of ratio as part-to-part and part-to-whole, and the concept of percent as part-to-whole.	Name That Portion Investigation 1: Session 1-7 Investigation 2: Session 1-9 Investigation 3: Session 3-8 Investigation 4: Session 1-4
E. Use order of operations, including use of parenthesis and exponents to solve multi-step problems, and verify and interpret the results.	8. Identify and use relationships between operations to solve problems.	Mathematical Thinking at Grade 5 Investigation 1: Session 1-6 Investigation 2: Session 1-5 Investigation 3: Session 1-5 Investigation 4: Session 1-6 Between Never and Always Investigation 1: Session 7 Building On Numbers You Know Investigation 1: Session 1-8 Investigation 2: Session 1-7 Investigation 3: Session 1-10 Investigation 4: Session 1-2 Investigation 5: Session 1-8

Number, Number Sense	Indicators	Investigations in Number, Data, & Space
(continued)	<p>9. Use order of operations, including use of parentheses, to simplify numerical expressions.</p>	<p>Mathematical Thinking at Grade 5            Investigation 1: Session 1-6            Investigation 2: Session 1-5            Investigation 3: Session 1-5            Investigation 4: Session 1-6            Between Never and Always            Investigation 1: Session 7            Building On Numbers You Know            Investigation 1: Session 1-8            Investigation 2: Session 1-7            Investigation 3: Session 1-10            Investigation 4: Session 1-2            Investigation 5: Session 1-8</p>
	<p><i>Note: There are instances when a grade-level indicator for one standard is linked to a benchmark for a different standard. See also correlation for <b>Patterns, Functions and Algebra</b> for indicator 8.</i></p>	<p>Not Applicable</p>



Number, Number Sense	Indicators	Investigations in Number, Data, & Space
F. Apply number system properties when performing computations.	7. Use commutative, associative, distributive, identity and inverse properties to simplify and perform computations.	Mathematical Thinking at Grade 5 Investigation 1: Session 1-6 Investigation 2: Session 1-5 Investigation 3: Session 1-5 Investigation 4: Session 1-6 Between Never and Always Investigation 1: Session 7 Building On Numbers You Know Investigation 1: Session 1-8 Investigation 2: Session 1-7 Investigation 3: Session 1-10 Investigation 4: Session 1-2 Investigation 5: Session 1-8
G. Apply and explain the use of prime factorizations, common factors, and common multiples in problem situations.	5. Recognize and identify perfect squares and their roots.	Mathematical Thinking at Grade 5 Investigation 1: Session 5-7 Investigation 4: Session 2-6
H. Use and analyze the steps in standard and non-standard algorithms for computing with fractions, decimals and integers.	10. Justify why fractions need common denominators to be added or subtracted.	Name That Portion Investigation 1: Session 7 Investigation 2: Session 1-9 Investigation 3: Session 1-8 Data: Kids, Cats, and Ads Investigation 4: Session 3
	11. Explain how place value is related to addition and subtraction of decimals; e.g., $0.2 + 0.14$ ; the two tenths is added to the one tenth because they are both tenths.	Name That Portion Investigation 3: Sessions 2-4, 7

Number, Number Sense	Indicators	Investigations in Number, Data, & Space
<p>I. Use a variety of strategies, including proportional reasoning, to estimate, compute, solve and explain solutions to problems involving integers, fractions, decimals and percents.</p>	<p>4. Round decimals to a given place value and round fractions (including mixed numbers) to the nearest half.</p>	<p>The following references are to a variety of estimation techniques, including rounding. Estimation and Number Sense is a recurrent feature in the Ten-Minute appendices in <b>Investigations in Number, Data, and Space</b> series in Grade 5.</p> <p>Between Never and Always            Ten-Minute Math: Nearest Answer            Building On Numbers You Know            Investigation 1: Session 2            Investigation 3: Session 1-6            Investigation 5: Session 1-2            Measurement Benchmarks            Ten –Minute Math: Estimation and Number Sense            Patterns of Chance            Ten-Minute Math: Nearest Answers            Data: Kids, Cats, and Ads            Investigation 3: Session 1-3            Investigation 4: Session 1-3</p>
	<p>12. Use physical models, points of reference, and equivalent forms to add and subtract commonly used fractions with like and unlike denominators and decimals.</p>	<p>Name That Portion            Investigation 2: Session 1-9            Investigation 3: Session 1-8            Data: Kids, Cats, and Ads            Investigation 4: Session 3</p>

Number, Number Sense	Indicators	Investigations in Number, Data, & Space
(continued)	13. Estimate the results of computations involving whole numbers, fractions and decimals, using a variety of strategies.	Building on Numbers You Know Investigation 1: Session 2 Investigation 3: Session 1-6 Investigation 5: Session 1-2 Measurement Benchmarks Ten-Minute Math: Estimation and Number Sense Data: Kids, Cats, and Ads Investigation 3: Session 1-3 Investigation 4: Session 1-3
	<i>Note: There are instances where a grade-level indicator is linked to a benchmark for a grade band that does not include the grade level of the indicator. See Grade 8 (page 33) for indicator 5.</i>	Not applicable.
F. Apply number system properties when performing computations.	7. Use commutative, associative, distributive, identity and inverse properties to simplify and perform computations.	Mathematical Thinking at Grade 5 Investigation 1: Session 1-6 Investigation 2: Session 1-5 Investigation 3: Session 1-5 Investigation 4: Session 1-6 Between Never and Always Investigation 1: Session 7 Building On Numbers You Know Investigation 1: Session 1-8 Investigation 2: Session 1-7 Investigation 3: Session 1-10 Investigation 4: Session 1-2 Investigation 5: Session 1-8

Measurement Standard	Indicators	Investigations in Number, Data, & Space
A. Select appropriate units to measure angles, circumference, surface area, mass and volume, using:	1. Identify and select appropriate units to measure angles; i.e., degrees.	Picturing Polygons Investigation 1: Sessions 1-3, 6-9 Investigation 3: Session 1-3
<ul style="list-style-type: none"> <li>• U.S. customary units; e.g., degrees, square feet, pounds, and other units as appropriate;</li> </ul>		Measurement Benchmarks Investigation 1: Session 1 Investigation 2: Session 1, 4
<ul style="list-style-type: none"> <li>• Metric units; e.g., square meters, kilograms and other units as appropriate.</li> </ul>		Measurement Benchmarks Investigation 1: Session 1 Investigation 2: Session 1, 4
B. Convert units of length, area, volume, mass and time within the same measurement system.	5. Make simple unit conversions within a measurement system; e.g., inches to feet, kilograms to grams, quarts to gallons. <b>(Grade 4)</b>	Measurement Benchmarks Investigation 1: Session 4-8
	5. Make conversions within the same measurement system while performing computations.	Measurement Benchmarks Investigation 1: Session 4-8
C. Identify appropriate tools and apply appropriate techniques for measuring angles, perimeter or circumference and area of triangles, quadrilaterals, circles, and composite shapes, and surface area and volume of prisms and cylinders.	6. Use strategies to develop formulas for determining perimeter and area of triangles, rectangles and parallelograms, and volume of rectangular prisms.	Picturing Polygons Investigation 3: Session 4-6 Containers and Cubes Investigation 1: Session 1-4 Investigation 2: Session 1-5 Investigation 3: Session 1-3 Investigation 4: Session 1-9

Measurement Standard	Indicators	Investigations in Number, Data, & Space
(continued)	7. Use benchmark angles (e.g.; 45°, 90°, 120°) to estimate the measure of angles, and use a tool to measure and draw angles.	Picturing Polygons Investigation 2: Sessions 1-3, 6-9 Investigation 3: Session 1-3
D. Select a tool and measure accurately to a specified level of precision.		Measurement Benchmarks Investigation 3: Session 1-3
E. Use problem solving techniques and technology as needed to solve problems involving length, weight, perimeter, area, volume, time and temperature.	6. Write, solve and verify solutions to multi-step problems involving measurement. <b>(Grade 4)</b>	Mathematical Thinking at Grade 5 Investigation 3: Session 2-4 Picturing Polygons Investigation 2: Sessions 1-2, 5-6 Name That Portion Investigation 1: Session 7 Investigation 2: Session 1-9 Investigation 3: Session 1-8 Investigation 4: Session 1-7 Building On Numbers You Know Investigation 1: Session 1 Investigation 2: Session 1-7 Investigation 3: Session 1-10 Investigation 3: Session 1-5 Measurement Benchmarks Investigation 3: Session 3 Patterns of Change Investigation 1: Session 1-4 Investigation 2: Session 6-7

Measurement Standard	Indicators	Investigations in Number, Data, & Space
(continued)	1. Identify paths between points on a grid or coordinate plane and compare the lengths of the paths; e.g., shortest path, paths of equal length.	Picturing Polygons Investigation 1: Session 3-4 Investigation 2: Sessions 4-7, 9 Investigation 3: Sessions 1-2, 5-6
F. Analyze and explain what happens to area and perimeter or surface area and volume when the dimensions of an object are changed.	1. Demonstrate and describe the differences between covering the faces (surface area) and filling the interior (volume) of three-dimensional objects.	Containers and Cubes Investigation 2: Session 1-2 Data: Kids, Cats, and Ads Ten-Minute Math: Surface Area and Volume
	2. Demonstrate understanding of the differences among linear units, square units and cubic units.	Can be developed from Containers and Cubes Investigation 2: Session 1-2 Data: Kids, Cats, and Ads Ten-Minute Math: Surface Area and Volume
G. Understand and demonstrate the independence of perimeter and area for two-dimensional shapes and of surface area and volume for three-dimensional shapes.	8. Use geometric models to solve problems in other areas of mathematics, such as number (multiplication/division) and measurement (area, perimeter, border). <b>Geometry and Spatial Sense (Grade 4)</b>	Picturing Polygons Investigation 3: Session 4-6 Containers and Cubes Investigation 1: Session 1-4 Investigation 2: Session 1-5 Investigation 3: Session 1-3 Investigation 4: Session 1-9
	3. Demonstrate and describe the differences between covering the faces (surface area) and filling the interior (volume) of three-dimensional objects.	Containers and Cubes Investigation 2: Session 1-5 Data: Kids, Cats, and Ads Ten-Minute Math: Surface Area and Volume

Measurement Standard	Indicators	Investigations in Number, Data, & Space
(continued)	4. Demonstrate understanding of the differences among linear units, square units and cubic units.	Can be developed from Containers and Cubes Investigation 2: Session 1-5 Data: Kids, Cats, and Ads Ten-Minute Math: Surface Area and Volume
	<i>Note: There are instances when a grade-level indicator for one standard is linked to a benchmark for a different standard. See correlation for <b>Patterns, Functions and Algebra</b> for indicator 6.</i>	Not applicable

Geometry and Spatial Sense	Indicators	Investigations in Number, Data, & Space
A. Identify and label angle parts and the regions defined within the plane where the angle resides.	2. Use standard language to describe line, segment, ray, angle, skew, parallel and perpendicular.	Picturing Polygons Investigation 2: Session 1-7 Investigation 3: Session 4-6
	3. Label vertex, rays, interior and exterior for an angle.	Picturing Polygons Investigation 2: Sessions 1-3, 6-9 Investigation 3: Session 1-3
B. Draw circles, and identify and determine the relationships among the radius, diameter, center and circumference.	1. Draw circles, and identify and determine relationships among the radius, diameter, center and circumference; e.g., radius is half the diameter, the ratio of the circumference of a circle to its diameter is an approximation of $\pi$ .	Can be developed from Name That Portion Investigation 2: Session 1-2 Investigation 3: Session 8 Investigation 4: Session 2-7
C. Specify locations and plot ordered pairs on a coordinate plane.	6. Extend understanding of coordinate system to include points whose $x$ or $y$ values may be negative numbers.	Can be developed from Picturing Polygons Investigation 1: Session 3-4 Investigation 2: Sessions 4-7, 9 Investigation 3: Sessions 1-2, 5-6
D. Identify, describe and classify types of line pairs, angles, two-dimensional figures and three-dimensional objects using their properties.	1. Use standard language to describe line, segment, ray, angle, skew, parallel and perpendicular.	Picturing Polygons Investigation 2: Session 1-7 Investigation 3: Session 4-6
	5. Use physical models to determine the sum of the interior angles of triangles and quadrilaterals.	Picturing Polygons Investigation 2: Sessions 1-3, 6-9 Investigation 3: Session 1-3



Geometry and Spatial Sense	Indicators	Investigations in Number, Data, & Space
(continued)	6. Understand that the measure of an angle is determined by the degree of rotation of an angle side rather than the length of either side.	Picturing Polygons Investigation 2: Sessions 1-3, 6-9 Investigation 3: Session 1-3
E. Use proportions to express relationships among corresponding parts of similar figures.		Picturing Polygons Investigation 3: Session 4-7
F. Describe and use the concepts of congruence, similarity and symmetry to solve problems.	4. Describe and use properties of congruent figures to solve problems.	Can be developed from Picturing Polygons Investigation 3: Session 4-7
G. Describe and use properties of triangles to solve problems involving angle measures and side lengths of right triangles.	5. Use physical models to determine the sum of the interior angles of triangles and quadrilaterals.	Picturing Polygons Investigation 2: Sessions 1-3, 6-9 Investigation 3: Session 1-3
H. Predict and describe results (size, position, orientation) of transformations of two-dimensional figures.		Picturing Polygons Investigation 2: Session 4-8 Investigation 3: Session 4-6
I. Identify and draw three-dimensional objects from different views (top, side, front and perspective).	8. Predict what three-dimensional object will result from folding a two-dimensional net, then confirm the prediction by folding the net.	Containers and Cubes Investigation 4: Sessions 1-3, 7-9
J. Apply properties of equality and proportionality to solve problems involving congruent or similar figures; e.g., create a scale drawing.	4. Describe and use properties of congruent figures to solve problems.	Can be developed from Picturing Polygons Investigation 3: Session 4-7

Patterns, Functions and Algebra	Indicators	Investigations in Number, Data, & Space
A. Describe, extend and determine the rule for patterns and relationships occurring in numeric patterns, computation, geometry, graphs and other applications.	1. Justify a general rule for a pattern or a function by using physical materials, visual representations, words, tables or graphs.	Picturing Polygons Investigation 3: Sessions 1-2, 5-6 Measurement Benchmarks Investigation 3: Session 3 Patterns of Change Investigation 1: Session 1-4
	2. Use calculators or computers to develop patterns, and generalize them using tables and graphs.	Picturing Polygons Investigation 3: Sessions 1-2, 5-6 Measurement Benchmarks Investigation 3: Session 3 Patterns of Change Investigation 1: Session 1-4
B. Represent, analyze and generalize a variety of patterns and functions with tables, graphs, words and symbolic rules.	3. Use variables as unknown quantities in general rules when describing patterns and other relationships.	Picturing Polygons Investigation 3: Sessions 1-2, 5-6 Measurement Benchmarks Investigation 3: Session 3 Patterns of Change Investigation 1: Session 1-4

Patterns, Functions and Algebra	Indicators	Investigations in Number, Data, & Space
C. Use variables to create and solve equations and inequalities representing problem situations.	4. Create and interpret the meaning of equations and inequalities representing problem situations.	Mathematical Thinking at Grade 5 Investigation 3: Session 2-4 Picturing Polygons Investigation 3: Sessions 1-2, 5-6 Name That Portion Investigation 1: Session 7 Investigation 2: Session 1-9 Investigation 3: Session 1-8 Investigation 4: Session 1-7 Building On Numbers You Know Investigation 1: Session 1 Investigation 2: Session 1-7 Investigation 3: Session 1-10 Investigation 5: Session 1-7 Measurement Benchmarks Investigation 3: Session 3 Patterns of Change Investigation 1: Session 1-4 Investigation 2: Session 6-7

Patterns, Functions and Algebra	Indicators	Investigations in Number, Data, & Space
D. Use symbolic algebra to represent and explain mathematical relationships.		Mathematical Thinking at Grade 5 Investigation 3: Session 2-4 Picturing Polygons Investigation 3: Sessions 1-2, 5-6 Name That Portion Investigation 1: Session 7 Investigation 2: Session 1-9 Investigation 3: Session 1-8 Investigation 4: Session 1-7 Building On Numbers You Know Investigation 1: Session 1 Investigation 2: Session 1-7 Investigation 3: Session 1-10 Investigation 5: Session 1-7 Measurement Benchmarks Investigation 3: Session 3 Patterns of Change Investigation 1: Session 1-4 Investigation 2: Session 6-7
E. Use rules and variables to describe patterns, functions and other relationships.	3. Use variables as unknown quantities in general rules when describing patterns and other relationships.	Picturing Polygons Investigation 3: Sessions 1-2, 5-6 Measurement Benchmarks Investigation 3: Session 3 Patterns of Change Investigation 1: Session 1-4

Patterns, Functions and Algebra	Indicators	Investigations in Number, Data, & Space
<p>F. Use representations, such as tables, graphs and equations, to model situations and to solve problems, especially those that involve linear relationships.</p>	<p>5. Model problems with physical materials and visual representations, and use models, graphs and tables to draw conclusions and make predictions.</p>	<p>Mathematical Thinking at Grade 5  Investigation 3: Session 2-4  Picturing Polygons  Investigation 3: Sessions 1-2, 5-6  Name That Portion  Investigation 1: Session 7  Investigation 2: Session 1-9  Investigation 3: Session 1-8  Investigation 4: Session 1-7  Building On Numbers You Know  Investigation 1: Session 1  Investigation 2: Session 1-7  Investigation 3: Session 1-10  Investigation 5: Session 1-7  Measurement Benchmarks  Investigation 3: Session 3  Patterns of Change  Investigation 1: Session 1-4  Investigation 2: Session 6-7</p>

Patterns, Functions and Algebra	Indicators	Investigations in Number, Data, & Space
G. Write, simplify and evaluate algebraic expressions.	3. Use variables as unknown quantities in general rules when describing patterns and other relationships.	Mathematical Thinking at Grade 5 Investigation 3: Session 2-4 Picturing Polygons Investigation 3: Sessions 1-2, 5-6 Name That Portion Investigation 1: Session 7 Investigation 2: Session 1-9 Investigation 3: Session 1-8 Investigation 4: Session 1-7 Building On Numbers You Know Investigation 1: Session 1 Investigation 2: Session 1-7 Investigation 3: Session 1-10 Investigation 5: Session 1-7 Measurement Benchmarks Investigation 3: Session 3 Patterns of Change Investigation 1: Session 1-4 Investigation 2: Session 6-7

<b>Data Analysis &amp; Probability</b>	<b>Indicators</b>	<b>Investigations in Number, Data, &amp; Space</b>
A. Read, create and use line graphs, histograms, circle graphs, box-and-whisker plots, stem-and-leaf plots, and other representations when appropriate.	1. Read, construct and interpret frequency tables, circle graphs and line graphs.	Name That Portion Investigation 4: Sessions 1, 5-6 Patterns of Change Investigation 1: Session 1-4 Investigation 2: Session 3-5 Investigation 3: Session 1-6 Data: Kids, Cats, and Ads Investigation 1: Session 1-4 Investigation 2: Session 1-2 Investigation 3: Session 2-4 Investigation 4: Session 2-3 Investigation 5: Session 1-5
B. Interpret data by looking for patterns and relationships, draw and justify conclusions, and answer related questions.		Name That Portion Investigation 4: Sessions 1, 5-6 Patterns of Change Investigation 1: Session 1-4 Investigation 2: Session 3-5 Investigation 3: Session 1-6 Data: Kids, Cats, and Ads Investigation 1: Session 1-4 Investigation 2: Session 1-2 Investigation 3: Session 2-4 Investigation 4: Session 2-3 Investigation 5: Session 1-5

<b>Data Analysis &amp; Probability</b>	<b>Indicators</b>	<b>Investigations in Number, Data, &amp; Space</b>
C. Evaluate interpretations and conclusions as additional data are collected, modify conclusions and predictions, and justify new findings.	5. Modify initial conclusions, propose and justify new interpretations and predictions as additional data are collected.	Name That Portion Investigation 4: Sessions 1, 5-6 Patterns of Change Investigation 1: Session 1-4 Investigation 2: Session 3-5 Investigation 3: Session 1-6 Data: Kids, Cats, and Ads Investigation 1: Session 1-4 Investigation 2: Session 1-2 Investigation 3: Session 2-4 Investigation 4: Session 2-3 Investigation 5: Session 1-5
D. Compare increasingly complex displays of data, such as multiple sets of data on the same graph.	3. Read and interpret increasingly complex displays of data, such as double bar graphs.	Name That Portion Investigation 4: Sessions 1, 5-6 Patterns of Change Investigation 1: Session 1-4 Investigation 2: Session 3-5 Investigation 3: Session 1-6 Data: Kids, Cats, and Ads Investigation 1: Session 1-4 Investigation 2: Session 1-2 Investigation 3: Session 2-4 Investigation 4: Session 2-3 Investigation 5: Session 1-5



Data Analysis & Probability	Indicators	Investigations in Number, Data, & Space
E. Collect, organize, display, and interpret data for a specific purpose or need.	2. Select and use a graph that is appropriate for the type of data to be displayed; e.g., numerical vs. categorical data, discrete vs. continuous data.	Name That Portion Investigation 4: Sessions 1, 5-6 Patterns of Change Investigation 1: Session 1-4 Investigation 2: Session 3-5 Investigation 3: Session 1-6 Data: Kids, Cats, and Ads Investigation 1: Session 1-4 Investigation 2: Session 1-2 Investigation 3: Session 2-4 Investigation 4: Session 2-3 Investigation 5: Session 1-5
	4. Determine appropriate data to be collected to answer questions posed by students or teacher, collect and display data, and clearly communicate findings.	Name That Portion Investigation 4: Sessions 1, 5-6 Patterns of Change Investigation 1: Session 1-4 Investigation 2: Session 3-5 Investigation 3: Session 1-6 Data: Kids, Cats, and Ads Investigation 1: Session 1-4 Investigation 2: Session 1-2 Investigation 3: Session 2-4 Investigation 4: Session 2-3 Investigation 5: Session 1-5

<b>Data Analysis &amp; Probability</b>	<b>Indicators</b>	<b>Investigations in Number, Data, &amp; Space</b>
F. Determine and use the range, mean, median and mode to analyze and compare data, and explain what each indicates about the data.	6. Determine and use the range, mean, median and mode, and explain what each does and does not indicate about the set of data.	Data: Kids, Cats, and Ads Investigation 1: Session 1-4 Investigation 2: Session 1-3 Investigation 3: Session 1-4 Investigation 5: Session 3-5
G. Evaluate conjectures and predictions based upon data presented in tables and graphs, and identify misuses of statistical data and displays.		Patterns of Change Investigation 1: Session 1-4 Investigation 2: Session 3-5 Investigation 3: Session 1-6 Data: Kids, Cats, and Ads Investigation 1: Session 1-4 Investigation 2: Session 1-3 Investigation 3: Session 1-4 Investigation 5: Session 3-5
H. Find all possible outcomes of simple experiments or problem situations, using methods such as lists, arrays and tree diagrams.	7. List and explain all possible outcomes in a given situation.	Between Never and Always Investigation 1: Session 1-7 Investigation 2: Session 1-5 Building On Numbers You Know Ten-Minute Math: What Is Likely?
I. Describe the probability of an event using ratios, including fractional notation.	8. Identify the probability of events within a simple experiment, such as three chances out of eight.	Between Never and Always Investigation 1: Session 1-7 Investigation 2: Session 1-5 Building On Numbers You Know Ten-Minute Math: What Is Likely?

<b>Data Analysis &amp; Probability</b>	<b>Indicators</b>	<b>Investigations in Number, Data, &amp; Space</b>
(continued)	9. Use 0,1 and ratios between 0 and 1 to represent the probability of outcomes for an event, and associate the ratio with the likelihood of the outcome.	Between Never and Always Investigation 1: Session 1-7 Investigation 2: Session 1-5 Building On Numbers You Know Ten-Minute Math: What Is Likely?
J. Compare experimental and theoretical results for a variety of simple experiments.	10. Compare what should happen (theoretical/expected results) with what did happen (experimental/actual results) in a simple experiment.	Between Never and Always Investigation 1: Session 1-7 Investigation 2: Session 1-5 Building On Numbers You Know Ten-Minute Math: What Is Likely?
K. Make and justify predictions based on experimental and theoretical probabilities.	11. Make predictions based on experimental and theoretical probabilities.	Between Never and Always Investigation 1: Session 1-7 Investigation 2: Session 1-5 Building On Numbers You Know Ten-Minute Math: What Is Likely?