

A Correlation of



to the

**Tennessee**  
**Curriculum Standards,**  
**Learning Expectations, and**  
**Accomplishments**  
Grades K-5



T/M-144A

## Introduction

This document demonstrates how ***Investigations in Number, Data, and Space®*** supports the Tennessee Curriculum Standards, Learning Expectations, and Accomplishments. The citations within this correlation provide Investigation Curriculum Unit titles, followed by the Investigation number and Session number or Focus Time/Choice Time title. Additional citations to other features may be included.

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

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

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

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

***Investigations in Number, Data and Space®*** was developed after three years of nationwide field-testing and includes teacher's practical suggestions, student dialogues, and teacher notes. Further information can be found on the internet at [www.scottforesman.com/investigations](http://www.scottforesman.com/investigations).

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**Investigations in Number, Data, & Space  
to the  
Tennessee Curriculum Standards,  
Learning Expectations, and Accomplishments**

**Kindergarten**

**NUMBER AND OPERATIONS**

**Content Standard 1.0** The student will develop number and operation sense needed to represent numbers and number relationships verbally, symbolically, and graphically and to compute fluently and make reasonable estimates in problem solving.

**K.1.1 Understand numbers, ways of representing numbers, relationships among numbers, and number systems.**

Mathematical Thinking in Kindergarten

Investigations 1, 2, 3, 4

Patterns, Trains, and Hopscotch Paths

Investigation 4: Choice Time: 12 Chips; Choice Time: Staircase Patterns

Collecting, Counting, and Measuring

Investigations 1, 2, 3, 4, 5, 6

Counting Ourselves and Others

Investigations 1, 2, 3, 4

How Many in All?

Investigations 1, 2, 3, 4

Classroom Routines: Attendance, The Counting Jar, Calendar

**a. count sets of objects up to 20;**

Mathematical Thinking in Kindergarten

Investigations 1, 2, 3

Patterns, Trains, and Hopscotch Paths

Investigation 4: Choice Time: 12 Chips; Choice Time: Staircase Patterns

Collecting, Counting, and Measuring

Investigations 1, 2, 3, 4, 5

Counting Ourselves and Others

Investigations 1, 3, 4

How Many in All?

Investigations 1, 2, 3, 4

Classroom Routines: Attendance, The Counting Jar, Calendar

- b. count by ones and tens to 50;**  
Mathematical Thinking in Kindergarten  
Investigation 1: Focus Time: Attendance  
Investigations 2, 3, 4  
Collecting, Counting, and Measuring  
Investigations 1, 2, 4, 5, 6  
Counting Ourselves and Others  
Investigations 1, 2, 3, 4
- c. count backward from 10 to 1;**  
*This accomplishment can be introduced during this investigation.*  
Mathematical Thinking in Kindergarten  
Investigation 3: Focus Time: Calendar
- d. match quantities up to twenty with numerals;**  
Mathematical Thinking  
Investigations 2, 3  
Counting Ourselves and Others  
Investigations 1, 2  
Collecting, Counting, and Measuring  
Investigations 1, 2  
About Classroom Routines: Calendar
- e. recognize equivalent sets of objects;**  
Mathematical Thinking  
Investigation 4  
Collecting, Counting, and Measuring  
Investigation 4  
Counting Ourselves and Others  
Investigation 4
- f. write numerals up to twenty;**  
Mathematical Thinking in Kindergarten  
Investigations 2, 3, 4  
Counting Ourselves and Others  
Investigation 1  
How Many in All?  
Investigation 2  
Investigation 3: Choice Time: Counters in a Cup  
Investigation 4: Choice Time: Six Crayons in All  
Collecting, Counting, and Measuring  
Investigation 1  
Investigation 2: Focus Time: Taking Inventory

- g. represent quantities up to 20 on ten-frames;**  
Collecting, Counting, and Measuring  
Investigations 3, 5
- h. determine whether a figure has been divided in halves;**  
*This accomplishment can be introduced during this investigation.*  
Making Shapes and Building Blocks  
Investigation 4: Choice Time: Fill the Hexagons  
*See also, Grade 1.*
- i. name and identify coins and their values;**  
Counting Ourselves and Others  
Investigation 2: Choice Time: The Grocery Store
- j. order numbers less than 20;**  
Collecting, Counting, and Measuring  
Investigation 5: Focus Time, Choice Time  
Investigation 6: Focus Time, Choice Time
- k. express the relationship between two numbers less than 20 using the words less than, more than, or equal to;**  
Mathematical Thinking in Kindergarten  
Investigation 1: Focus Time: Attendance  
Investigations 2, 3, 4  
Patterns, Trains, and Hopscotch Paths  
Investigation 4: Choice Time: 12 Chips; Choice Time: Staircase Patterns  
Counting Ourselves and Others  
Investigations 3, 4  
How Many In All?  
Investigation 2: Choice Time: Grab Two Handfuls  
Investigation 3: Choice Time: Double Compare  
Investigation 4: Focus Time: Blue and Red Crayons  
Collecting, Counting, and Measuring  
Investigations 3, 4, 5, 6
- l. identify the position of a whole number less than 20 on the number line;**  
*Number lines can be introduced during any of these routines.*  
All curriculum units:  
Classroom Routines: Counting Jar; Calendar
- m. apply the language of ordinal numbers up to tenth.**  
Mathematical Thinking in Kindergarten  
Investigation 3: Focus Time: Calendar

**K.1.2 Understand meanings of operations and how they relate to one another.**

Mathematical Thinking in Kindergarten

Investigations 3, 4

How Many in All?

Investigation 1: Choice Time: Collect 15 Together, Inventory Bags

Investigations 2, 3, 4

Counting Ourselves and Others

Investigations 2, 3, 4

Collecting, Counting, and Measuring

Investigation 4: Choice Time: Collect 10 Together

Investigation 5: Choice Time: Racing Bears

Investigation 6

**a. use manipulatives to develop strategies for addition and subtraction of whole numbers;**

How Many in All?

Investigation 1: Choice Time: Collect 15 Together, Inventory Bags

Investigations 2, 3, 4

Counting Ourselves and Others

Investigation 4

Collecting, Counting, and Measuring

Investigation 4: Choice Time: Collect 10 Together

Investigation 5: Choice Time: Racing Bears

Investigation 6

**b. use a variety of strategies to solve simple verbal story problems involving numbers 0 to 10.**

Mathematical Thinking in Kindergarten

Investigations 3, 4

Counting Ourselves and Others

Investigations 2, 3, 4

How Many in All?

Investigation 3

**K.1.3 Solve problems, compute fluently, and make reasonable estimates.**

Mathematical Thinking in Kindergarten

Investigations 1, 2, 3

Pattern Trains and Hopscotch Paths

Investigations 1, 2, 3, 4

Collecting, Counting, and Measuring

Investigations 1, 3, 4, 6

Counting Ourselves and Others

Investigations 1, 2, 4

Making Shapes and Building Blocks

Appendix: Shapes Teacher Tutorial, pages 143–144

How Many in All?

Investigations 1, 2, 3, 4

Classroom Routines: Calendar; Patterns on the Pocket Chart

**a. use words, actions, pictures, or manipulatives to solve problems;**

*These are a few of the many examples.*

Mathematical Thinking in Kindergarten

Investigations 2, 3

Pattern Trains and Hopscotch Paths

Investigations 1, 2, 3, 4

Collecting, Counting, and Measuring

Investigations 3, 4, 6

Counting Ourselves and Others

Investigation 4

Making Shapes and Building Blocks

Appendix: Shapes Teacher Tutorial, pages 143–144

How Many in All?

Investigation 2, 3, 4

Classroom Routines: Calendar; Patterns on the Pocket Chart

**b. use pictures or objects, such as a ten frame, to show one more or one less than any number to 20;**

*These investigations provide opportunities for students to count up or count back by 1.*

Mathematical Thinking in Kindergarten

Investigation 1: Focus Time: Attendance

Investigation 2

Patterns, Trains, and Hopscotch Paths

Investigation 4: Choice Time: Staircase Patterns

Collecting, Counting, and Measuring

Investigations 1, 4

How Many In All?

Investigation 1: Choice Time: Collect 15 Together

Classroom Routines: Counting Jar



**c. explain the reasonableness of a solution.**

Pattern Trains and Hopscotch Paths

Investigations 3, 4

Counting Ourselves and Others

Investigations 1, 2

Investigation 3: Choice Time: Yes/No Surveys

**ALGEBRA**

**Content Standard 2.0** The student will understand and generalize patterns as they represent and analyze quantitative relationships and change in a variety of contexts and problems using graphs, tables, and equations.

**K.2.1 Sort and classify objects by size, number, and other properties.**

Counting Ourselves and Others

Investigation 1: Focus Time, Choice Time

Investigation 2: Focus Time, Choice Time

Investigation 3: Focus Time, Choice Time

**a. sort objects by color, size, shape, and kind;**

Counting Ourselves and Others

Investigation 1: Focus Time, Choice Time

Investigation 2: Focus Time, Choice Time

Investigation 3: Focus Time, Choice Time

**b. communicate using mathematical terms appropriately.***These are a few of the many examples.*

Mathematical Thinking in Kindergarten

Investigation 2 and Dialogue Box, page 39

Pattern Trains and Hopscotch Paths

Investigation 1 and Dialogue Box, page 21

Collecting, Counting, and Measuring

Investigation 2 and Dialogue Box, page 33

Counting Ourselves and Others

Investigations 1, 4 and Dialogue Box, page 35

Making Shapes and Building Blocks:

Investigation 3 and Dialogue Box, pages 58–59

How Many In All?

Investigations 1, 3 and Dialogue Box, pages 72–73

**K.2.2 Represent and analyze patterns and functions.**

Mathematical Thinking in Kindergarten

Investigation 1: Choice Time

Pattern Trains and Hopscotch Paths

Investigation 1: Focus Time, Choice Time

Investigation 2: Choice Time

Investigation 3: Focus Time, Choice Time

Investigation 4: Focus Time, Choice Time

**a. identify patterns in the environment, in arrangements of objects, or in pictures;**

Mathematical Thinking in Kindergarten

Investigation 1: Choice Time

Pattern Trains and Hopscotch Paths

Investigation 1: Focus Time, Choice Time

Investigation 2: Choice Time

Investigation 3: Focus Time, Choice Time

Investigation 4: Focus Time, Choice Time

**b. recognize and extend a concrete, visual, or auditory two- or three-part repeating pattern;**

Mathematical Thinking in Kindergarten

Investigation 1: Choice Time

Pattern Trains and Hopscotch Paths

Investigation 1: Focus Time, Choice Time

Investigation 2: Choice Time

Investigation 3: Focus Time, Choice Time

Investigation 4: Focus Time, Choice Time

**c. create and describe a simple repeating pattern.**

Mathematical Thinking in Kindergarten

Investigation 1: Choice Time

Pattern Trains and Hopscotch Paths

Investigation 1: Focus Time, Choice Time

Investigation 2: Choice Time

Investigation 3: Focus Time, Choice Time

Investigation 4: Focus Time, Choice Time

**K.2.3 Use concrete, pictorial, and verbal representations to develop an understanding of the language and symbols of mathematics.**

Collecting, Counting, and Measuring

Investigation 4: Choice Time: Collect 10 together

Investigation 5: Choice Time: Racing Bears

Investigation 6

How Many in All?

Investigations 2, 3, 4

**a. use manipulatives or pictures to demonstrate addition and subtraction sentences written symbolically involving numbers 0 to 5;**

Collecting, Counting, and Measuring

Investigation 4: Choice Time: Collect 10 together

Investigation 5: Choice Time: Racing Bears

Investigation 6

How Many in All?

Investigations 2, 3, 4

**b. read and explain simple addition and subtraction number sentences written symbolically.**

How Many in All?

Investigations 2, 3, 4

**K.2.4 Illustrate general properties of operations.*****[no accomplishments for this learning expectation at the Kindergarten level].****This investigation prepares students to apply this expectation.*

How Many in All?

Investigation 2: Choice Time: Towers of Six

**K.2.5 Analyze change in various contexts.*****[no accomplishments for this learning expectation at the Kindergarten level].***

Making Shapes and Building Blocks

Investigation 4

**GEOMETRY****Content Standard 3.0**

The student will develop an understanding of geometric concepts and relationships as the basis for geometric modeling and reasoning to solve problems involving one-, two-, and three-dimensional figures.

**K.3.1 Analyze characteristics and properties of geometric shapes.**

Mathematical Thinking in Kindergarten

Investigation 1: Choice Time: Exploring Pattern Blocks

Investigation 1: Choice Time: Exploring Geoblocks

Making Shapes and Building Blocks

Investigations 1, 2, 3, 4, 5

**a. recognize and name circles, squares, triangles, and rectangles when shown in various positions;**

Making Shapes and Building Blocks

Investigations 1, 4

**b. recognize examples of circles, squares, triangles, and rectangles in the environment and as faces of three-dimensional objects;**

Mathematical Thinking in Kindergarten

Investigation 1: Choice Time: Exploring Pattern Blocks

Investigation 1: Choice Time: Exploring Geoblocks

Making Shapes and Building Blocks

Investigations 1, 2, 3, 4, 5

**c. recognize basic properties of and similarities and differences between simple geometric figures (e.g., number of sides, corners);**

Mathematical Thinking in Kindergarten

Investigation 1: Choice Time: Exploring Color Tiles, Exploring Pattern Blocks

Making Shapes and Building Blocks

Investigations 1, 2

**d. create circles, squares, rectangles, and triangles;**

Making Shapes and Building Blocks

Investigation 1

**e. create structures using three-dimensional shapes;**

Mathematical Thinking in Kindergarten

Investigation 1: Choice Time: Exploring Geoblocks

Making Shapes and Building Blocks

Investigations 3, 4, 5

**f. combine two-dimensional shapes to make pictures.**

Making Shapes and Building Blocks

Investigation 1: Choice Time: Pattern Block Pictures

Investigation 2: Choice Time: Pattern Block Puzzles

Investigation 3: Choice Time: Shape of Things on the Computer

Investigation 4: Choice Time: Build a Block

**K.3.2 Specify locations and describe spatial relationships.**

Patterns, Trains, and Hopscotch Paths

Investigation 4: Choice Time: Staircase Patterns

Making Shapes and Building Blocks

Investigations 2, 3, 4

**a. use directional terms in a variety of situations (e.g., over, under, forward, backward, between, right, left).**

Patterns, Trains, and Hopscotch Paths

Investigation 4: Choice Time: Staircase Patterns

Making Shapes and Building Blocks

Investigations 2, 3, 4

**K.3.3 Recognize and apply flips, slides, and turns.****[no accomplishments for this learning expectation at the Kindergarten level].***This investigation prepares students to apply this expectation.*

Making Shapes and Building Blocks

Investigation 2

**MEASUREMENT****Content Standard 4.0**

The student will become familiar with the units and processes of measurement in order to use a variety of tools, techniques, and formulas to determine and to estimate measurements in mathematical and real-world problems.

**K.4.1 Demonstrate understanding of units of measure and measurable attributes of objects.**

Mathematical Thinking

Investigation 3

Patterns, Trains and Hopscotch Paths

Investigation 1: Focus Time: Cubes What Do You Notice?

Collecting, Counting, and Measuring

Investigations 3, 4, 5

Counting Ourselves and Others

Investigation 2

How Many in All?

Investigation 1

Investigation 2: Choice Time: Towers of Six

Making Shapes and Building Blocks:

Investigations 4, 5

Classroom Routines: Calendar

**a. demonstrate understanding of the concept of length;**

Collecting, Counting, and Measuring

Investigations 3, 5

How Many in All?

Investigation 1

Investigation 2: Choice Time: Towers of Six

**b. compare the length, weight, and capacity of two objects;**

Patterns, Trains and Hopscotch Paths

Investigation 1: Focus Time: Cubes What Do You Notice?

Collecting, Counting, and Measuring

Investigations 3, 4, 5

Counting Ourselves and Others

Investigation 2

How Many in All?

Investigation 1

Investigation 2: Choice Time: Towers of Six

Making Shapes and Building Blocks:

Investigations 4, 5

**c. use words to describe time (e.g., day, night, morning, afternoon, yesterday, today, tomorrow);**

Mathematical Thinking in Kindergarten

Investigation 3

Classroom Routines: Calendar

**d. use words to describe temperature (e.g., hot, warm, cool, cold).**

See Grade 1: About Classroom Routines: Understanding Time and Changes

**K.4.2 Apply appropriate techniques and tools to determine measurements.**

How Many in All?

Investigation 1

Collecting, Counting and Measuring

Investigation 3

Mathematical Thinking in Kindergarten

Investigation 3: Focus Time: Calendar

Classroom Routines: Calendar

**a. measure and estimate length using a variety of non-standard units;**

How Many in All?

Investigation 1

Collecting, Counting and Measuring

Investigation 3

**b. distinguish between light and heavy objects;**

See Grade 1: Bigger, Taller, Heavier, Smaller

**c. tell time to the hour;**

Clock time is introduced in Grade 2.

**d. recognize a thermometer as a way of measuring temperature;**

See Grade 1: About Classroom Routines: Understanding Time and Changes

**e. recognize a calendar as a way of measuring time.**

Mathematical Thinking in Kindergarten

Investigation 3: Focus Time: Calendar

Classroom Routines: Calendar

**Data Analysis and Probability****Content Standard 5.0**

The student will understand and apply basic statistical and probability concepts as they, organize, and analyze data, and to make predictions and conjectures.

**K.5.1 Develop, select, and use appropriate methods to collect, organize, display, and analyze data.**

Counting Ourselves and Others

Investigation 1: Choice Time: Counting Chairs

Investigation 2: Focus Time: What Did You Eat for Lunch?; Choice Time:

Boxes, Bottles, and Cans; Clothing Sort

Investigation 3

**a. represent and compare data using concrete objects, pictures, and simple graphs.**

Counting Ourselves and Others

Investigation 1: Choice Time: Counting Chairs

Investigation 2: Focus Time: What Did You Eat for Lunch?; Choice Time: Boxes, Bottles, and Cans; Clothing Sort

Investigation 3

**K.5.2 Apply the basic concepts of probability.**

*This accomplishment can be introduced during this investigation.*

Collecting, Counting, and Measuring: Choice Time: Grab and Count

**a. describe events related to students' experiences as likely or unlikely.**

*This accomplishment can be introduced during this investigation.*

Collecting, Counting, and Measuring: Choice Time: Grab and Count



**Investigations in Number, Data, & Space  
to the  
Tennessee Curriculum Standards,  
Learning Expectations, and Accomplishments  
Grade One**

**NUMBER AND OPERATIONS**

**Content Standard 1.0** The student will develop number and operation sense needed to represent numbers and number relationships verbally, symbolically, and graphically and to compute fluently and make reasonable estimates in problem solving.

**1.1.1 Understand numbers, ways of representing numbers, relationships among numbers, and number systems.**

Mathematical Thinking at Grade 1

Investigation 1: Sessions 1–6

Investigation 2: Sessions 1–6

Investigation 3: Sessions 1–6

Investigation 4: Sessions 1–6

Investigation 5: Sessions 1–6

Building Number Sense

Investigation 1: Sessions 1–8

Investigation 2: Sessions 1–6, 8–9

Investigation 3: Sessions 1–7, 9

Investigation 4: Sessions 1–10

Quilt Squares and Block Towns

Investigation 1: Sessions 1–7, 9

Investigation 3: Sessions 6–7

Number Games and Story Problems

Investigation 1: Sessions 1–10

Investigation 2: Sessions 1–12

Bigger, Taller, Heavier, Smaller

Investigation 2: Sessions 1–7

Classroom Routines: Counting

**a. count by twos, fives, and tens to 100;**

Building Number Sense

Investigation 1: Session 1

Investigation 3: Sessions 1–2

Investigation 3: Sessions 1–2

Number Games and Story Problems

Investigation 2: Sessions 1–8, 10–12

Classroom Routines: Counting

**b. count a group of objects by ones to 100;**

Mathematical Thinking at Grade 1

Investigation 1: Sessions 2–8

Investigation 2: Sessions 4–6

Investigation 4: Sessions 1–6

Building Number Sense

Investigation 1: Sessions 1–8

Quilt Squares and Block Towns

Investigation 1: Sessions 2–10

Number Games and Story Problems

Investigation 2: Session 3

**c. count a group of objects by twos, fives, and tens up to 30;**

Number Games and Story Problems

Investigation 2: Sessions 1–8, 10–12

**d. count forward or backward by one beginning with any number less than 100;**

Mathematical Thinking at Grade 1

Investigation 1: Sessions 2–4

Investigation 2: Sessions 1–6

Investigation 4: Sessions 1–6

Investigation 5: Sessions 1–6

Building Number Sense

Investigation 1: Sessions 1–8

Investigation 2: Sessions 1–6, 8–9

Investigation 3: Session 1–7, 9

Investigation 4: Sessions 1–10

Classroom Routines: Counting

**e. recognize the place value of a digit in numbers to 99;**

Number Games and Story Problems

Investigation 2: Sessions 10–12

**f. read and write numerals up to 100;**

Mathematical Thinking at Grade 1

Investigation 1: Sessions 2–4

Investigation 2: Sessions 1–6

Investigation 4: Sessions 1–6

Investigation 5: Sessions 1–6

Building Number Sense

Investigation 1: Sessions 1–8

Investigation 2: Sessions 1–6, 8–9

Investigation 3: Sessions 1–7, 9

Investigation 4: Sessions 1–10

Number Games and Story Problems  
Investigation 2: Sessions 6–12  
Bigger, Taller, Heavier, Smaller  
Investigation 2: Sessions 1–7  
Classroom Routines: Counting

**g. count by tens from any number using a hundred chart;**

Building Number Sense  
Investigation 3: Sessions 1 and 2, 8

**h. use manipulatives to model whole numbers to 99 (e.g., base-ten blocks, sticks, straws);**

Mathematical Thinking at Grade 1  
Investigation 1: Sessions 2–4  
Investigation 2: Sessions 1–6  
Investigation 4: Sessions 1–6  
Investigation 5: Sessions 1–6  
Building Number Sense  
Investigation 1: Sessions 7–9  
Investigation 2: Sessions 1–2, 9  
Investigation 3: Session 9  
Investigation 4: Sessions 1–5, 7–10

**i. identify odd and even whole numbers to 50;**

*These investigations provide opportunities to introduce this accomplishment.*

Mathematical Thinking at Grade 1  
Investigation 2 : Sessions 1–6  
Investigation 4: Session 4  
Building Number Sense  
Investigation 1: Sessions 1–9  
Investigation 2 : Sessions 1–8  
Investigation 3 : Sessions 1–2  
Number Games and Story Problems  
Investigation 1 : Sessions 1–9  
Classroom Routines : Counting

**j. model halves and fourths of a single object or figure;**

*Related content:*

Mathematical Thinking in Grade 1  
Investigation 5: Sessions 2–4  
Number Games and Story Problems  
Investigation 1: Sessions 7–9  
Classroom Routines: Counting

**k. model halves and fourths of a set of objects;***Related content:*

Mathematical Thinking in Grade 1  
Investigation 5: Sessions 2–4  
Number Games and Story Problems  
Investigation 1: Sessions 7–9  
Classroom Routines: Counting

**l. match the spoken, written, concrete, and pictorial representations of  $\frac{1}{2}$  and  $\frac{1}{4}$ ;***Related content:*

Mathematical Thinking in Grade 1  
Investigation 5: Sessions 2–4  
Number Games and Story Problems  
Investigation 1: Sessions 7–9  
Classroom Routines: Counting

**m. recognize one whole as two halves or four fourths;***Related content:*

Mathematical Thinking in Grade 1  
Investigation 5: Sessions 2–4  
Number Games and Story Problems  
Investigation 1: Sessions 7–9  
Classroom Routines: Counting

**n. count the value of a set of coins up to fifty cents;**

Number Games and Story Problems  
Investigation 2: Sessions 2–8

**o. order whole numbers less than 100;**

Mathematical Thinking at Grade 1  
Investigation 2: Sessions 2, 3, 5–6  
Number Games and Story Problems  
Investigation 1: Sessions 7–9  
Building Number Sense  
Investigation 3: Sessions 1–2

**p. represent numbers in flexible ways using a variety of materials (e.g., 23 as 23 ones, 1 ten and 13 ones, and/or 2 tens and 3 ones);**

Building Number Sense

Investigation 1: Sessions 7–8

Investigation 2: Sessions 1–2, 4–9

Investigation 4: Sessions 1–10

**q. apply the language of ordinal numbers up to twelfth;**

*These activities provide opportunities for practice with ordinal numbers. Notes to the Teacher point them out.*

Mathematical Thinking at Grade 1

Investigation 2: Sessions 2 and 3 (See page 37.)

Building Number Sense

Investigation 3: Sessions 1–2

**r. compare two numbers using the appropriate symbol (i.e.,  $<$ ,  $>$ ,  $=$ );**

*Using symbols to compare two numbers can be introduced during these investigations.*

Mathematical Thinking at Grade 1

Investigation 2: Sessions 2, 3, 5–6

Number Games and Story Problems

Investigation 1: Sessions 7–9

**s. use a number line or hundred grid to determine one more or one less than any number to 50.**

Building Number Sense

Investigation 3: 1 and 2

**1.1.2 Understand meanings of operations and how they relate to one another.**

Building Number Sense

Investigation 2: Session 2

Investigation 3: Sessions 5–7, 9

Investigation 4: Sessions 3, 4, 5, 10

Quilt Squares and Block Towns

Investigation 3: Sessions 6–7

Number Games and Story Problems

Investigation 1: Session 10

Investigation 3: Sessions 3–8, 10–12, 13

Bigger, Taller, Heavier, Smaller

Investigation 2: Session 1

**a. explain the reasonableness of a solution;**

Building Number Sense

Investigation 3: Sessions 5–7, 9

Quilt Squares and Block Towns

Investigation 3: Sessions 6–7

Bigger, Taller, Heavier, Smaller

Investigation 2: Session 1

**b. solve simple story problems involving addition and subtraction with numbers less than 20;**

Mathematical Thinking at Grade 1

Investigation 4: Sessions 5–6

Building Number Sense

Investigation 2: Session 2

Investigation 4: Sessions 3, 4, 5, 10

Number Games and Story Problems

Investigation 1: Session 10

Investigation 3: Sessions 3–8, 10–12, 13

**c. develop story problems that illustrate basic addition and subtraction facts.**

Building Number Sense

Investigation 2: Session 2

Number Games and Story Problems

Investigation 1: Session 10

Investigation 3: Session 10

**1.1.3 Solve problems, compute fluently, and make reasonable estimates.**

Mathematical Thinking in Grade 1

Investigation 2: Sessions 1–6

Investigation 4: Sessions 2–4, 6

Building Number Sense

Investigation 1: Sessions 1–2, 5–6, 9

Investigation 2: Sessions 1, 4–9

Investigation 3 : Sessions 1–9

Investigation 4: Sessions 1–10

Quilt Squares and Block Towns

Investigation 1: Sessions 2–10

Investigation 3: Sessions 6–7

Number Games and Story Problems

Investigation 1: Sessions 1–10

Investigation 2: Sessions 1–8, 10–13

Investigation 3: Sessions 1–13

**a. use words, actions, pictures, and manipulatives to solve problems;**

*These are some of the many investigations where students use words, actions, pictures, and manipulatives to solve problems.*

Mathematical Thinking in Grade 1

Investigation 2: Sessions 1–6

Investigation 4: Sessions 2–4, 6

Building Number Sense

Investigation 1: Sessions 1–2, 5–6, 9

Investigation 2: Sessions 1, 4–9

Investigation 4: Sessions 1–10

Quilt Squares and Block Towns

Investigation 1: Sessions 2–10

Investigation 3: Sessions 6–7

Number Games and Story Problems

Investigation 1: Sessions 1–10

Investigation 2: Sessions 1–8, 10–13

Investigation 3: Sessions 1–13

**b. use pictures or objects, such as ten frames, to show one more or one less than any number to 99;**

*These investigations provide opportunities to introduce this concept.*

Mathematical Thinking at Grade 1

Investigation 4: Session 5

Building Number Sense

Investigation 3: Sessions 1–9

**c. estimate the number of objects in a group and explain the reasoning for the estimate;**

Building Number Sense

Investigation 3: Session 9

Bigger, Taller, Heavier, Smaller

Investigation 2: Session 1

**d. explain and justify solutions and strategies in problem solving;**

Mathematical Thinking in Grade 1

Investigation 2: Sessions 1–6

Investigation 4: Sessions 2–4, 6

Building Number Sense

Investigation 1: Sessions 1–2, 5–6, 9

Investigation 2: Sessions 1, 4–9

Investigation 4: Sessions 1–10

Number Games and Story Problems

Investigation 1: Sessions 1–10

Investigation 2: Sessions 1–8, 10–13

Investigation 3: Sessions 1–13

- e. use a variety of strategies to add and subtract two-digit whole numbers (e.g., counting up or back, taking away, doubles plus one, comparison, number relationships, modeling);**

Number Games and Story Problems  
Investigation 2: Session 13

- f. use calculators in problem-solving situations.**

Mathematical Thinking at Grade 1  
Investigation 1: Sessions 2, 3, and 4  
Building Number Sense  
Investigation 3: Sessions 3–7  
Number Games and Story Problems  
Investigation 2: Sessions 10–12

## **ALGEBRA**

**Content Standard 2.0** The student will understand and generalize patterns as they represent and analyze quantitative relationships and change in a variety of contexts and problems using graphs, tables, and equations.

### **1.2.1 Sort and classify objects by size, number, and other properties.**

Mathematical Thinking at Grade 1  
Investigation 5: Sessions 3–6  
Survey Questions and Secret Rules  
Investigation 1: Sessions 2–6  
Investigation 2: Sessions 3–4  
Investigation 4: Sessions 2–3  
Quilt Squares and Block Towers  
Investigation 1: Sessions 11–12  
Investigation 2: Sessions 1–3

- a. sort objects by two attributes;**

Mathematical Thinking at Grade 1  
Investigation 5: Sessions 3–6  
Survey Questions and Secret Rules  
Investigation 1: Sessions 2–6  
Investigation 2: Sessions 3–4  
Investigation 4: Sessions 2–3  
Quilt Squares and Block Towers  
Investigation 1: Sessions 11–12  
Investigation 2: Sessions 1–3



**b. describe how objects in a group are alike and how they are different.**

Mathematical Thinking at Grade 1

Investigation 5: Sessions 3–6

Survey Questions and Secret Rules

Investigation 1: Sessions 2–6

Investigation 2: Sessions 3–4

Investigation 4: Sessions 2–3

Quilt Squares and Block Towers

Investigation 1: Sessions 11–12

Investigation 2: Sessions 1–3

**1.2.2 Represent and analyze patterns and functions.**

Mathematical Thinking at Grade 1

Investigation 3: Sessions 1–6

Investigation 4: Session 2–3, 4–6

Quilt Squares and Block Towns

Investigation 1: Sessions 13–15

Building Number Sense

Investigation 3: Sessions 1–8

Investigation 4: Session 10

Number Games and Story Problems

Investigation 2: Sessions 1–12

**a. identify and describe growing patterns found in literature, in the environment, in physical arrangements, and in pictures;**

Mathematical Thinking at Grade 1

Investigation 3: Sessions 1–6

Investigation 4: Session 5

Building Number Sense

Investigation 3: Sessions 1–8

Investigation 4: Session 10

Number Games and Story Problems

Investigation 2: Sessions 1–12

**b. translate a repeating pattern from one medium to another (e.g., red-blue-blue to snap-clap-clap);**

Mathematical Thinking at Grade 1

Investigation 3: Session 2

Building Number Sense

Investigation 4: Session 10

**c. create, describe, and extend concrete, visual, auditory, and number patterns;**

- Mathematical Thinking at Grade 1
  - Investigation 3: Sessions 1–6
  - Investigation 4: Session 2–3, 4–6
- Quilt Squares and Block Towns
  - Investigation 1: Sessions 13–15
- Building Number Sense
  - Investigation 3: Sessions 1–8
  - Investigation 4: Session 10
- Number Games and Story Problems
  - Investigation 2: Sessions 1–12

**d. identify the unit of a two-part repeating pattern.**

- Mathematical Thinking at Grade 1
  - Investigation 3: Session 2
- Building Number Sense
  - Investigation 4: Session 10

**1.2.3 Use concrete, pictorial, and verbal representations to develop an understanding of the language and symbols of mathematics.**

- Mathematical Thinking at Grade 1
  - Investigation 4: Sessions 1–3
  - Investigation 5: Sessions 1–5
- Building Number Sense
  - Investigation 1: Sessions 2–4, 7–9
  - Investigation 2: Sessions 1–2, 6–9
  - Investigation 4: Sessions 1–5, 7–10
- Number Games and Story Problems
  - Investigation 1: Sessions 1–10
  - Investigation 2: Sessions 1–8, 10–13
  - Investigation 3: Sessions 1–13

**a. use manipulatives to demonstrate addition and subtraction sentences written symbolically involving numbers 0-20;**

- Mathematical Thinking at Grade 1
  - Investigation 4: Sessions 1–3
  - Investigation 5: Sessions 1–5
- Building Number Sense
  - Investigation 1: Sessions 2–4, 7–9
  - Investigation 2: Sessions 1–2, 6–9
  - Investigation 4: Sessions 1–5, 7–10

Number Games and Story Problems  
Investigation 1: Sessions 1–10  
Investigation 2: Sessions 1–8, 10–13  
Investigation 3: Sessions 1–13

**b. communicate and use mathematical terms and symbols appropriately;**

Building Number Sense  
Investigation 2: Sessions 1–2, 6–9  
Investigation 4: Sessions 1–5, 7–10  
Number Games and Story Problems  
Investigation 1: Sessions 1–10

**c. interpret and solve simple open addition sentences.**

*These activities provide opportunities to introduce this concept.*

Mathematical Thinking at Grade 1  
Investigation 2: Session 4  
Investigation 4: Session 4  
Building Number Sense  
Investigation 2: Sessions 1–9  
Number Games and Story Problems  
Investigation 1: Sessions 1–10  
Investigation 3: Sessions 1–8, 10–13

**1.2.4 Illustrate general properties of operations.**

*This accomplishment can be introduced during this investigation.*

Number Games and Story Problems  
Investigation 1: Sessions 2–3

*Related content:*

Building Number Sense  
Investigation 1: Sessions 7–8 (See page 27.)  
Investigation 2: Sessions 4–5, 6–8 (See pages 65, 71.)

**a. apply the commutative property of addition.**

*This accomplishment can be introduced during this investigation.*

Number Games and Story Problems  
Investigation 1: Sessions 2–3

*Related content:*

Building Number Sense  
Investigation 1: Sessions 7–8 (See page 27.)  
Investigation 2: Sessions 4–5, 6–8 (See pages 65, 71.)

**1.2.5 Analyze change in various contexts.**

**[no accomplishments for this learning expectation at the first grade level].**

Quilt Squares and Block Towns

Investigation 1: Sessions 13–15

**GEOMETRY****Content Standard 3.0**

The student will develop an understanding of geometric concepts and relationships as the basis for geometric modeling and reasoning to solve problems involving one-, two-, and three-dimensional figures.

**1.3.1 Analyze characteristics and properties of geometric shapes.**

Mathematical Thinking at Grade 1

Investigation 1: Sessions 1–4

Quilt Squares and Block Towns

Investigation 1: Sessions 1, 3–15

Investigation 2: Sessions 7–10

Investigation 3: Sessions 3–4

**a. recognize basic properties of and similarities and differences between simple geometric figures (e.g., number of sides, corners);**

Mathematical Thinking at Grade 1

Investigation 1: Sessions 1–4

Quilt Squares and Block Towns

Investigation 1: Sessions 1, 3–6, 8–15

Investigation 3: Sessions 3–4

**b. predict and describe the results of putting together and taking apart two- and three-dimensional geometric figures.**

Quilt Squares and Block Towns

Investigation 1: Sessions 3–10

Investigation 2: Sessions 7–10

Investigation 3: Sessions 1–5

**1.3.2 Specify locations and describe spatial relationships.**

Quilt Squares and Block Towns

Investigation 1: Sessions 1, 3–6, 8–10

Investigation 3: Sessions 6–7

**a. uses directional terms in a variety of situations (e.g., over, under, forward, backward, between, right, left);**

Quilt Squares and Block Towns

Investigation 3: Sessions 6–7

**b. apply spatial sense to create a figure from memory;**

Quilt Squares and Block Towns

Investigation 1: Sessions 1, 3–6, 8–10

**c. identify the position of a whole number on the number line.***Related content:*

Mathematical Thinking at Grade 1

Investigation 2: Sessions 2 and 3

Building Number Sense

Investigation 3: Sessions 1 and 2

Number Games and Story Problems

Investigation 2: Sessions 6, 7, and 8

**1.3.3 Recognize and apply flips, slides, and turns.****[no accomplishments for this learning expectation at the first grade level].**

Quilt Squares and Block Towns

Investigation 1: Sessions 3–10, 13–15

**MEASUREMENT****Content Standard 4.0**

The student will become familiar with the units and processes of measurement in order to use a variety of tools, techniques, and formulas to determine and to estimate measurements in mathematical and real-world problems.

**1.4.1 Demonstrate understanding of units of measure and measurable attributes of objects.**

Bigger, Taller, Heavier, Smaller

Investigation 1: Sessions 1–7

Investigation 2: Sessions 1–7

Investigation 3: Session 2

**a. compare and order objects according to length, capacity, and weight;**

Bigger, Taller, Heavier, Smaller

Investigation 1: Sessions 1–7

Investigation 2: Sessions 1–7

**b. recognize the need for standard units of measurement.**

Bigger, Taller, Heavier, Smaller

Investigation 3: Session 2

**1.4.2 Apply appropriate techniques and tools to determine measurements.**

Bigger, Taller, Heavier, Smaller

Investigation 2: Sessions 1–6

Investigation 3: Sessions 1–5

Classroom Routines: Counting; Understanding Time and Changes

**a. demonstrate understanding of the concept of length;**

Bigger, Taller, Heavier, Smaller

Investigation 3: Sessions 1–5

**b. measure and estimate length using a variety of non-standard units;**

Bigger, Taller, Heavier, Smaller

Investigation 3: Sessions 2, 4–5

**c. measure to the nearest inch or centimeter;**

*Non-standard units are used in these investigations.*

Bigger, Taller, Heavier, Smaller

Investigation 3: Sessions 1–5

**d. measure weight to nearest pound or kilogram;**

*Non-standard units are used in these investigations.*

Bigger, Taller, Heavier, Smaller

Investigation 2: Sessions 1–6

**e. recognize a calendar is a way of measuring time;**

Survey Questions and Secret Rules

Investigation 3: Sessions 1–3

Classroom Routines: Counting; Understanding Time and Changes

**f. describe the relationship between days and months;**

Survey Questions and Secret Rules

Investigation 3: Sessions 1–3

Classroom Routines: Counting; Understanding Time and Changes

**g. read and write time to the hour and half-hour;**

*These Classroom Routines provide opportunities to introduce this accomplishment.*

Classroom Routines: Understanding Time and Changes.

*See also, Grade 3.*

**h. compare units of time;**

*These Classroom Routines provide opportunities to introduce this accomplishment.*

Classroom Routines: Understanding Time and Changes.

*See also, Grade 3.*

**i. use a thermometer to measure temperature.**

*These activities provide opportunities to introduce this accomplishment.*

Survey Questions and Secret Rules

Classroom Routines: Understanding Time and Changes (Weather)

**DATA ANALYSIS AND PROBABILITY****Content Standard 5.0**

The student will understand and apply basic statistical and probability concepts as they, organize, and analyze data, and to make predictions and conjectures.

**1.5.1 Develop, select, and use appropriate methods to collect, organize, display, and analyze data.**

Mathematical Thinking at Grade 1

Investigation 5: Sessions 5–6

Survey Questions and Secret Rules

Investigation 3: Sessions 1–3

Investigation 4: Sessions 2–5

**a. represent and interpret data using concrete objects, pictures, pictographs, and bar graphs.**

Mathematical Thinking at Grade 1

Investigation 5: Sessions 5–6

Survey Questions and Secret Rules

Investigation 3: Sessions 1–3

Investigation 4: Sessions 2–5

**1.5.2 Apply the basic concepts of probability.**

Probability is introduced in Grade 3.

**a. describe events related to students' experiences as likely or unlikely.**

Probability is introduced in Grade 3.

**Investigations in Number, Data, & Space  
to the  
Tennessee Curriculum Standards,  
Learning Expectations, and Accomplishments  
Grade Two**

**NUMBER AND OPERATIONS**

**Content Standard 1.0** The student will develop number and operation sense needed to represent numbers and number relationships verbally, symbolically, and graphically and to compute fluently and make reasonable estimates in problem solving.

**2.1.1 Understand numbers, ways of representing numbers, relationships among numbers, and number systems.**

Mathematical Thinking at Grade 2

Investigation 1: Session 1

Investigation 2: Sessions 1–8

Investigation 3: Sessions 3–4, 6

Investigation 4: Sessions 1–4

Investigation 5: Sessions 4–5

Coins, Coupons, and Combinations

Investigation 1: Sessions 10, 11

Investigation 2: Sessions 1–5, 6–9, 10

Investigation 3: Session 3

Investigation 4: Sessions 1–5

Shapes, Halves, and Symmetry

Investigation 3: Sessions 1–8

Putting Together and Taking Apart

Investigation 2: Sessions 1, 3–7

Investigation 4: Sessions 1, 3–4

Classroom Routines: Today's Number, How Many Pockets?

- a. count a set of objects to 100 using an efficient grouping strategy (e.g., two's, three's, five's, ten's);**

Mathematical Thinking at Grade 2

Investigation 2: Session 6

Investigation 4: Sessions 1–4

Investigation 5: Sessions 4–5

Coins, Coupons, and Combinations

Investigation 2: Sessions 1–5



**b. count forward and backward by one from any number less than 999;**

Mathematical Thinking at Grade 2

Investigation 2: Session 6

Investigation 3: Sessions 3–4, 6

Investigation 4: Sessions 1–4

Investigation 5: Sessions 4–5

Coins, Coupons, and Combinations

Investigation 2: Sessions 1–5

Investigation 3: Session 3

Investigation 4: Sessions 1–4

Putting Together and Taking Apart

Investigation 2: Sessions 3–7

Investigation 4: Session 1

**c. read and write numerals to 999;**

Mathematical Thinking at Grade 2

Investigation 1: Session 1

Investigation 2: Sessions 1–7

Coins, Coupons, and Combinations

Investigation 4: Session 1

Putting Together and Taking Apart:

Investigation 2: Session 1

Classroom Routines: Today's Number, How Many Pockets?

**d. recognize the place value of a digit in numbers to 999;**

Mathematical Thinking at Grade 2

Investigation 2: Session 1

Coins, Coupons, and Combinations

Investigation 4: Sessions 1–5

Putting Together and Taking Apart

Investigation 2: Sessions 1–4

About Classroom Routines: How Many Pockets

**e. identify odd and even numbers to 100;***Students gain experience with even numbers when counting by twos in these investigations.*

Mathematical Thinking at Grade 2

Investigation 4: Session 2: Teacher Note, page 91

Coins, Coupons, and Combinations

Investigation 2: Sessions 1–5

- f. use concrete models or pictures to show whether a fraction is less than a half, more than a half, or equal to a half;**  
*These investigations extensively cover the concept of one half.*  
Shapes, Halves, and Symmetry  
Investigation 3: Sessions 1–5
- g. match the spoken, written, concrete, and pictorial representations of halves, thirds, and fourths;**  
Shapes, Halves, and Symmetry  
Investigation 3: Sessions 1–8
- h. compare the unit fractions  $\frac{1}{2}$ ,  $\frac{1}{3}$ , and  $\frac{1}{4}$ ;**  
Shapes, Halves, and Symmetry  
Investigation 3: Sessions 3–5, 7–8
- i. count the value of a set of coins up to one dollar;**  
Mathematical Thinking at Grade 2  
Investigation 4: Sessions 2–4  
Coins, Coupons, and Combinations  
Investigation 2: Sessions 2–5, 6–9, 10  
Putting Together and Taking Apart  
Investigation 2: Sessions 5–6  
Investigation 4: Sessions 3–4
- j. order whole numbers less than 1000;**  
Coins, Coupons, and Combinations  
Investigation 4: Sessions 2–4
- k. compare two numbers using the appropriate symbol (i.e.,  $<$ ,  $>$ ,  $=$ );**  
*Using symbols to compare numbers can be introduced during these investigations.*  
Coins, Coupons, and Combinations  
Investigation 4: Sessions 1–4  
Putting Together and Taking Apart  
Investigation 2: Sessions 3–7  
Investigation 4: Session 1
- l. represent numbers to 999 in flexible ways using a variety of materials (e.g., 23 as 23 ones, 1 ten and 13 ones, and/or 2 tens and 3 ones);**  
Mathematical Thinking at Grade 2  
Investigation 2: Sessions 1, 6, 8  
Coins, Coupons, and Combinations  
Investigation 1: Sessions 10, 11  
Investigation 2: Session 10  
Investigation 4: Sessions 1–4

**m. apply the language of ordinal numbers up to twentieth.**

*These activities provide opportunities for practice with ordinal numbers.*

Mathematical Thinking at Grade 2

Investigation 2: Sessions 1, 6

Investigation 3: Session 3–6

Investigation 4: Sessions 1–4

Investigation 5: Sessions 3–5

**2.1.2 Understand meanings of operations and how they relate to one another.**

Mathematical Thinking at Grade 2

Investigation 2: Session 1

Investigation 4: Sessions 3 and 4

Coins, Coupons, and Combinations

Investigation 2: Session 1

Investigation 3: Sessions 3, 4, 5 (Follow-Up)

Putting Together and Taking Apart

Investigation 1: Sessions 1–2, 5–6

Investigation 3: Sessions 2–5

Investigation 4: Sessions 2–4

Investigation 5: Sessions 1–3

Classroom Routines: Writing Equations

**a. develop a story problem that illustrates a given addition or subtraction number sentence;**

Coins, Coupons, and Combinations

Investigation 2: Session 1

Investigation 3: Sessions 3–5 (Follow-Up)

Putting Together and Taking Apart

Investigation 1: Sessions 1–2, 5–6

Investigation 3: Sessions 3–5

Investigation 4: Sessions 2–4

Investigation 5: Sessions 2 and 3

**b. use the number line to demonstrate addition and subtraction;**

*Related Content:*

Mathematical Thinking at Grade 2

Investigation 2: Session 1

Investigation 4: Sessions 3 and 4

Coins, Coupons and Combinations

Investigation 3: Session 1

Investigation 4: Session 1

Putting Together and Taking Apart

Investigation 1: Session 1–2

**c. write and identify number sentences that describe situations involving addition and subtraction;**

Putting Together and Taking Apart

Investigation 1: Sessions 1–2, 5–6

Investigation 3: Sessions 2–5

Investigation 4: Sessions 2–4

Investigation 5: 1–3

Classroom Routines: Writing Equations

**d. write and explain related addition and subtraction sentence.**

Coins, Coupons, and Combinations

Investigation 3: Sessions 3, 4–5

Putting Together and Taking Apart

Investigation 1: Sessions 1, 2 (See also, Teacher Note, page 25.)

Investigation 3: Session 2

**2.1.3 Solve problems, compute fluently, and make reasonable estimates.**

Mathematical Thinking at Grade 2

Investigation 4: Sessions 1, 5

Investigation 5: Sessions 3

Putting Together and Taking Apart

Investigation 1: Sessions 1–6

Investigation 2: Sessions 3–4, 7

Investigation 3: Session 2, 3–5

Investigation 4: Sessions 1, 2, 3–4

Investigation 5: Sessions 1, 2–3, 4–5, 7

Coins, Coupons, and Combinations

Investigation 2: Session 7–11

Investigation 3: Sessions 1–5

Investigation 4: Sessions 2–4, 5

Shapes, Halves, and Symmetry

Investigation 1: Sessions 2–6

Investigation 2: Sessions 4–5

How Long? How Far?

Investigation 1: Sessions 1–7

Investigation 2: Session 2

**a. solve story problems involving numbers to 100;**

Putting Together and Taking Apart

Investigation 1: Sessions 1–6

Investigation 2: Sessions 3–4, 7

Investigation 3: Session 2, 3–5

Investigation 4: Sessions 1, 2, 3–4

Investigation 5: Sessions 1, 2–3, 4–5, 7

Coins, Coupons, and Combinations  
Investigation 3: Sessions 1, 3, 4–5

**b. check for the reasonableness of solutions;**

Mathematical Thinking at Grade 2

Investigation 5: Session 3

Coins, Coupons, and Combinations

Investigation 1: Sessions 8–9, 11

Investigation 2: Session 10

Classroom Routines: How Many Pockets?

Shapes, Halves, and Symmetry

Investigation 1: Sessions 2–6

Investigation 2: Sessions 4–5

How Long? How Far?

Investigation 1: Sessions 1–7

Investigation 2: Session 2

**c. use calculators in problem-solving situations;**

Coins, Coupons, and Combinations

Investigation 1: Session 7, 8–9

**d. add and subtract efficiently and accurately with single-digit numbers;**

Mathematical Thinking at Grade 2

Investigation 2: Sessions 2–3, 8

Coins, Coupons, and Combinations

Investigation 1: Sessions 1–6

**e. use a variety of strategies and representations to add and subtract two-digit whole numbers;**

Mathematical Thinking at Grade 2

Investigation 4: Sessions 1, 5

Investigation 5: Sessions 3

Putting Together and Taking Apart

Investigation 1: Sessions 1–6

Investigation 2: Sessions 3–4, 7

Investigation 3: Session 2, 3–5

Investigation 4: Sessions 1, 2, 3–4

Investigation 5: Sessions 1, 2–3, 4–5, 7

Coins, Coupons, and Combinations

Investigation 2: Session 7–9

Investigation 3: Sessions 1–2

Investigation 4: Sessions 2–4, 5

**f. explain and justify solution strategies used in problem solving;**

Coins, Coupons, and Combinations

Investigation 1: Sessions 2–3, 6–11

Investigation 2: Sessions 7–9

Investigation 3: Sessions 1–2

Investigation 4: Sessions 2–5

Putting Together and Taking Apart

Investigation 1: Sessions 1–6

Investigation 2: Sessions 1–4, 7

Investigation 3: Sessions 1–5

Investigation 5: Sessions 1–5, 7

**g. use estimation to justify the reasonableness of a computation.**

Coins, Coupons, and Combinations

Investigation 1: Session 7

Investigation 1: Sessions 8–9: Choice 1: Close to 20, page 41

Investigation 2: Session 10

Classroom Routine: How Many Pockets?

**ALGEBRA**

**Content Standard 2.0** The student will understand and generalize patterns as they represent and analyze quantitative relationships and change in a variety of contexts and problems using graphs, tables, and equations.

**2.2.1 Sort and classify objects by size, number, and other properties.**

Mathematical Thinking at Grade 2

Investigation 5: Sessions 1–2, 4–5

Does It Walk, Crawl, or Swim?

Investigation 1: Sessions 1–6

Investigation 2: Sessions 1–4

Investigation 3: Sessions 1–4

Investigation 4: Sessions 1–3

**a. sort objects by two or more attributes;**

Mathematical Thinking at Grade 2

Investigation 5: Sessions 1–2, 4–5

Does It Walk, Crawl, or Swim?

Investigation 1: Sessions 1–6

Investigation 2: Sessions 1–4

Investigation 3: Sessions 1–4

Investigation 4: Sessions 1–3

**b. identify the rules by which objects or numbers have been sorted.**

Mathematical Thinking at Grade 2

Investigation 5: Sessions 1–2, 4–5, 6

Does It Walk, Crawl, or Swim?

Investigation 1: Sessions 1–3

Investigation 2: Sessions 1–2

**2.2.2 Represent and analyze patterns and functions.**

Mathematical Thinking at Grade 2

Investigation 2: Session 6

Investigation 4: Sessions 1–4

Investigation 5: Sessions 4–5

Coins, Coupons, and Combinations

Investigation 2: Sessions 1–5

Timelines and Rhythm Patterns

Investigation 2: Session 1–5

**a. extend a growing pattern;**

Mathematical Thinking at Grade 2

Investigation 2: Session 6

Investigation 4: Sessions 1–4

Investigation 5: Sessions 4–5

Coins, Coupons, and Combinations

Investigation 2: Sessions 1–5

**b. identify the unit of a three-part repeating pattern;**

Timelines and Rhythm Patterns

Investigation 2: Session 1–5

**c. translate a repeating pattern from one medium to another (e.g., red-blue-blue to snap-clap-clap);**

Timelines and Rhythm Patterns

Investigation 2: Sessions 2–5

**d. determine the output for a particular input given the one-operation function rule involving addition and subtraction.**

Coins, Coupons, and Combinations

Investigation 2: Sessions 1, 4–5

Timelines and Rhythm Patterns

Investigation 2: Sessions 1–5

**2.2.3 Use concrete, pictorial, and verbal representations to develop an understanding of the language and symbols of mathematics.**

Mathematical Thinking at Grade 2

Investigation 1: Session 1

Investigation 2: Session 6

Coin, Coupons, and Combinations

Investigation 1: Sessions 1–3, 6, 10–11

Investigation 2: Session 1

Investigation 3: Session 2

Putting Together and Taking Apart

Investigation 1: Sessions 1–6

Investigation 2: Sessions 1–7

Investigation 3: Sessions 1–5 (See Teacher Note, page 85.)

Investigation 4: Sessions 1–4

Investigation 5: Sessions 1–8

**a. interpret and solve open sentences that involve addition or subtraction;**

Putting Together and Taking Apart

Investigation 1: Sessions 3–4

Investigation 2: Session 2–5

**b. use the language and symbols of mathematics appropriately to communicate mathematical thinking;**

Mathematical Thinking at Grade 2

Investigation 1: Session 1

Investigation 2: Session 6

Coin, Coupons, and Combinations

Investigation 1: Sessions 1–3, 6, 10–11

Investigation 2: Session 1

Investigation 3: Session 2

Putting Together and Taking Apart

Investigation 1: Sessions 1–6

Investigation 2: Sessions 1–7

Investigation 3: Sessions 1–5 (See Teacher Note, page 85.)

Investigation 4: Sessions 1–4

Investigation 5: Sessions 1–8

**c. use manipulatives to demonstrate addition and subtraction sentences written symbolically involving numbers 0-20.**

Mathematical Thinking at Grade 2

Investigation 1: Session 1

Investigation 2: Session 6



- Coin, Coupons, and Combinations
  - Investigation 1: Sessions 1–3, 6, 10–11
  - Investigation 2: Session 1
  - Investigation 3: Session 2
- Putting Together and Taking Apart
  - Investigation 1: Sessions 1–6
  - Investigation 2: Sessions 1–7
  - Investigation 3: Sessions 1–5
  - Investigation 4: Sessions 1–4
  - Investigation 5: Sessions 1–8

### 2.2.4 Illustrate general properties of operations.

- Mathematical Thinking at Grade 2
  - Investigation 2: Session 6
  - Investigation 5: Session 3
- Classroom Routines: Today's Number

#### a. apply the commutative property of addition;

- Mathematical Thinking at Grade 2
  - Investigation 2: Session 6
  - Investigation 5: Session 3
- Classroom Routines: Today's Number

#### b. show that subtraction is not commutative;

- The idea that subtraction is not commutative can be introduced during this investigation.*
- Putting Together and Taking Apart
  - Investigation 1: Session 2

#### c. apply the addition and subtraction properties of zero.

- Mathematical Thinking at Grade 2
  - Investigation 2: Session 6

### 2.2.5 Analyze change in various contexts.

- How Long? How Far?
  - Investigation 1: Sessions 2–4, 5–7
- How Many Pockets? How Many Teeth?
  - Investigation 1: Sessions 1, 4–5
  - Investigation 2: Sessions 1–5

#### a. describe qualitative change (e.g., a student growing taller);

- How Long? How Far?
  - Investigation 1: Sessions 2–4, 5–7

- b. describe quantitative change (e.g., a student growing two inches in one year).**

How Many Pockets? How Many Teeth?

Investigation 1: Sessions 1, 4–5

Investigation 2: Sessions 1–5

## **GEOMETRY**

### **Content Standard 3.0**

The student will develop an understanding of geometric concepts and relationships as the basis for geometric modeling and reasoning to solve problems involving one-, two-, and three-dimensional figures.

#### **2.3.1 Analyze characteristics and properties of geometric shapes.**

Mathematical Thinking at Grade 2

Investigation 3: Sessions 1–5

Shapes, Halves, and Symmetry

Investigation 1: Session 1–8

Investigation 2: Sessions 1–6

Investigation 4: Sessions 1–8

- a. recognize, name, build, draw, and compare two- and three-dimensional geometric figures;**

Shapes, Halves, and Symmetry

Investigation 1: Sessions 2–5

Investigation 2: Sessions 4–5

Investigation 3: Sessions 1–8

- b. describe attributes and parts of two- and three-dimensional geometric figures;**

Mathematical Thinking at Grade 2

Investigation 3: Sessions 1–5

Shapes, Halves, and Symmetry

Investigation 1: Session 1

Investigation 2: Sessions 1, 2

Investigation 4: Sessions 1–7

- c. recognize shapes that have line symmetry;**

Shapes, Halves, and Symmetry

Investigation 4: Sessions 1–7

- d. investigate and predict the results of putting together and taking apart two- and three-dimensional geometric figures.**

Shapes, Halves, and Symmetry

Investigation 1: Sessions 2–8

Investigation 2: Sessions 3, 6

Investigation 4: Sessions 1–4

**2.3.2 Specify locations and describe spatial relationships.**

Shapes, Halves, and Symmetry

Investigation 1: Sessions 4–8

Investigation 4: Sessions 1–6

How Long? How Far?

Investigation 2: Sessions 1–3, 6–8

- a. identify the position of whole numbers on the number line.**

How Long? How Far?

Investigation 2: Sessions 1–3, 6–8

**2.3.3 Recognize and apply flips, slides, and turns.**

Shapes, Halves, and Symmetry

Investigation 1: Sessions 4–8

Investigation 4: Sessions 1–6

- a. illustrate flips, slides, and turns using concrete and pictorial materials.**

Shapes, Halves, and Symmetry

Investigation 1: Sessions 4–8

Investigation 4: Sessions 1–6

**MEASUREMENT**

**Content Standard 4.0**

The student will become familiar with the units and processes of measurement in order to use a variety of tools, techniques, and formulas to determine and to estimate measurements in mathematical and real-world problems.

**2.4.1 Demonstrate understanding of units of measure and measurable attributes of objects.**

Shapes, Halves, and Symmetry

Investigation 2: Session 2

How Long? How Far?

Investigation 1: Sessions 1–8

Investigation 2: Sessions 4–8

**a. compare and order objects according to length, capacity, and weight;**

How Long? How Far?

Investigation 1: Sessions 1–8

Investigation 2: Sessions 4–8

**b. demonstrate understanding of the concepts of perimeter and area;**

Shapes, Halves, and Symmetry

Investigation 2: Session 2

**c. identify the measurable attributes of objects in the environment.**

How Long? How Far?

Investigation 1: Sessions 2–4, 5–7

**2.4.2 Apply appropriate techniques and tools to determine measurements.**

Shapes, Halves, and Symmetry

Investigation 2: Session 2

How Long? How Far?

Investigation 1: Sessions 1, 2–4, 5–8

Timelines and Rhythm Patterns

Investigation 1: Sessions 1–5

Investigation 2: Sessions 1–4

About Classroom Routines: Time and Time Again

**a. read and write time to the hour, half-hour, and quarter-hour;**

This accomplishment is introduced in Grade 3.

**b. relate days, dates, weeks, and months to a calendar;**

Timelines and Rhythm Patterns

Investigation 1: Sessions 1–4

Investigation 2: Sessions 1–4

**c. explain the relationship between inches and feet;**

Students begin work with units of standard and metric measurements in Grade 3.

**d. measure length to the nearest centimeter, foot, half-inch, and inch;***Students begin work with units of standard and metric measurements in Grade 3.**Related content:*

How Long? How Far?

Investigation 1: Sessions 1–8

Investigation 2: Sessions 4–5

- e. use strategies to make estimates of length and time;**  
How Long? How Far?  
Investigation 1: Sessions 1, 2–4, 5–7  
Timelines and Rhythm Patterns  
Investigation 1: 1–3  
About Classroom Routines: Time and Time Again
- f. solve problems involving elapsed time in hour intervals;**  
Timelines and Rhythm Patterns  
Investigation 1: Sessions 4–5
- g. measure and estimate weight and capacity using a variety of non-standard units;**  
*Related content in Grade 3:*  
Combining and Comparing  
Investigation 2: Sessions 1–2  
Exploring Solids and Boxes Investigation 4: Session 1  
Investigation 5: Sessions 1–4
- h. find area and perimeter using non-standard units;**  
Shapes, Halves, and Symmetry  
Investigation 2: Session 2  
How Long? How Far?  
Investigation 2: 4–8
- i. read thermometers with Fahrenheit and Celsius scales.**  
*This investigation can be adapted to involve gathering temperature data.*  
How Many Pockets? How Many Teeth?  
Investigation 3: Session 1

## **DATA ANALYSIS AND PROBABILITY**

### **Content Standard 5.0**

The student will understand and apply basic statistical and probability concepts as they, organize, and analyze data, and to make predictions and conjectures.

#### **2.5.1 Develop, select, and use appropriate methods to collect, organize, display, and analyze data.**

- Mathematical Thinking at Grade 2  
Investigation 2: Session 6  
Investigation 5: Sessions 1–6  
Does It Walk, Crawl, or Swim?  
Investigation 1: Sessions 1–3  
Investigation 2: Sessions 3–4  
Investigation 3: Sessions 1–3

How Many Pockets? How Many Teeth?  
Investigation 1: Sessions 1–5  
Investigation 2: Sessions 1–6  
Investigation 3: Sessions 1–4  
Classroom Routines: How Many Pockets?

**a. pose questions and gather data to answer the questions;**

Mathematical Thinking at Grade 2  
Investigation 2: Session 6  
Investigation 5: Sessions 1–6  
Does It Walk, Crawl, or Swim?  
Investigation 1: Sessions 1–3  
Investigation 2: Sessions 3–4  
Investigation 3: Sessions 1–3

**b. read, interpret, and create tables using tally marks;**

Mathematical Thinking at Grade 2  
Investigation 5: Sessions 1–2  
Does It Walk, Crawl, or Swim?  
Investigation 1: Sessions 1–2

**c. create pictographs and bar graphs;**

Mathematical Thinking at Grade 2  
Investigation 5: Sessions 1–6  
Does It Walk, Crawl, or Swim?  
Investigation 1: Sessions 1–2  
How Many Pockets? How Many Teeth?  
Investigation 1: Sessions 1–5  
Investigation 2: Sessions 1–6  
Investigation 3: Sessions 1–4  
Classroom Routines: How Many Pockets?

**d. read and interpret tables, bar graphs, and pictographs.**

Mathematical Thinking at Grade 2  
Investigation 2: Session 6  
Investigation 5: Sessions 1–2  
Does it Walk, Crawl, or Swim?  
Investigation 1: Sessions 1–3  
Investigation 2: Sessions 3–4  
Investigation 3: Sessions 1–3  
How Many Pockets? How Many Teeth  
Investigation 1: Sessions 1–5  
Investigation 2: Sessions 1–5  
Investigation 3: Sessions 1–5

**2.5.2 Apply the basic concepts of probability.**

Probability is introduced in Grade 3.

**a. predict outcomes of events based on data gathered and displayed;**

This accomplishment is introduced in Grade 3.

**b. explain whether an event is likely or unlikely.**

This accomplishment is introduced in Grade 3.

**Investigations in Number, Data, & Space  
to the  
Tennessee Curriculum Standards,  
Learning Expectations, and Accomplishments  
Grade Three**

**NUMBER AND OPERATIONS**

**Content Standard 1.0** The student will develop number and operation sense needed to represent numbers and number relationships verbally, symbolically, and graphically and to compute fluently and make reasonable estimates in problem solving.

**3.1.1 Understand numbers, ways of representing numbers, relationships among numbers, and number systems.**

Mathematical Thinking at Grade 3

Investigation 1: Session 1

Investigation 2: Sessions 2, 5–7

Investigation 3: Sessions 2–7

Investigation 4: Sessions 1, 2, 3

Things that Come in Groups

Investigation 2: Sessions 2–4

Flips, Turns, and Areas

Investigation 2: Sessions 1–5

Landmarks in the Hundreds

Investigation 1: Sessions 1–7

Investigation 2: Session 4

Investigation 3: Sessions 1–3

Up and Down the Number Line

Investigation 1: Sessions 1, 2, 5, 8

Investigation 2: Sessions 1, 2, 3, 4

Investigation 3: Sessions 1, 2

Combining and Comparing

Investigation 1: Sessions 1–3

Investigation 2: Session 1–2

Investigation 3: Session 1–2

Investigation 4: Sessions 1–4

Investigation 5: Sessions 1–3

Fair Shares

Investigation 1: Sessions 1–4

Investigation 2: Sessions 1–7

Investigation 3: Sessions 1–3



- 
- a. count by tens, hundreds, or thousands from any whole number;**  
Things that Come in Groups  
Investigation 2: Sessions 2–4  
Landmarks in the Hundreds  
Investigation 1 : Sessions 4–5  
Investigation 3: Sessions 1–3
- b. skip count by tens from any whole number less than 1000;**  
Things That Come in Groups  
Investigation 2: Sessions 2–4  
Landmarks in the Hundreds  
Investigation 1 : Sessions 4–5  
Investigation 3 : Session 1–3
- c. read and write whole numbers to 9999;**  
Landmarks in the Hundreds  
Investigation 1: Sessions 3–4, 6–7  
Investigation 3: Sessions 1, 2–3  
Up and Down the Number Line  
Investigation 1: Sessions 1,2, 5, 8  
Investigation 2: Sessions 1, 2, 3, 4  
Investigation 3: Sessions 1, 2  
Combining and Comparing  
Investigation 4: Sessions 3–4
- d. represent numbers to 9999 in flexible ways using a variety of materials;**  
Mathematical Thinking at Grade 3  
Investigation 1: Session 1  
Investigation 3: Sessions 3–4  
Landmarks in the Hundreds  
Investigation 1: Sessions 1, 2–3  
Investigation 2: Sessions 1–3  
Combining and Comparing  
Investigation 4: Sessions 3–4
- e. identify whole numbers as odd or even;**  
Mathematical Thinking at Grade 3  
Investigation 4: Sessions 1, 2, 3
- f. name the place value of a given digit in whole numbers to 10,000's;**  
Mathematical Thinking at Grade 3  
Investigation 1: Session 1  
Investigation 2: Sessions 2, 5–7  
Investigation 3: Sessions 3–4  
Investigation 4: Session 1

## Combining and Comparing

Investigation 1: Sessions 1, 2

Investigation 2: Session 2

Investigation 3: Session 1

Investigation 4: Sessions 2, 3–4

- g. write whole numbers up to 10,000 in expanded form (e.g., 873 as  $800 + 70 + 3$ );**

*Related content:*

Mathematical Thinking at Grade 3

Investigation 2: Sessions 1, 2, 3, 4

- h. connect the spoken, written, concrete, and pictorial representations of fractions with denominators up to ten;**

Mathematical Thinking at Grade 3

Investigation 2: Sessions 3–4

Investigation 4: Session 2

Flips, Turns, and Areas

Investigation 2: Sessions 1–5

Fair Shares

Investigation 1: Sessions 1–4

Investigation 2: Sessions 1–7

Investigation 3: Sessions 1–3

- i. compare unit fractions with denominators up to ten;**

Fair Shares

Investigation 1: Sessions 3, 4

Investigation 2: Session 3

- j. compare and order decimal amounts in the context of money;**

*Related content:*

Fair Shares

Investigation 3: Sessions 1–3

- k. count the value of combinations of coins and bills up to \$5;**

Mathematical Thinking at Grade 3

Investigation 2: Sessions 5–7

Landmarks in the Hundreds

Investigation 1: Sessions 6–7

Investigation 2: Session 4

Combining and Comparing

Investigation 3: Sessions 1–2

**l. make change from a transaction that is less than a dollar;**

This accomplishment is investigated in Grade 4.

**m. order whole numbers to 10,000;**

Mathematical Thinking at Grade 3

Investigation 2: Sessions 2, 5–7

Investigation 3: Sessions 3–4

Investigation 4: Session 1

Combining and Comparing

Investigation 1: Sessions 1, 2

Investigation 2: Sessions 1–2

Investigation 3: Session 1

Investigation 4: Sessions 2, 3–4

**n. compare whole numbers to 9999 using the appropriate symbol (i.e.,  $<$ ,  $>$ ,  $=$ ).**

*These investigations provide opportunities to introduce using symbols to compare whole numbers.*

Mathematical Thinking at Grade 3

Investigation 3: Sessions 3–4

Combining and Comparing

Investigation 1: Sessions 1–3

Investigation 2: Sessions 1–2

Investigation 3: Session 1

Investigation 4: Sessions 1–2

Investigation 5: Sessions 1–3

Fair Shares

Investigation 2: Session 3

**3.1.2 Understand meanings of operations and how they relate to one another.**

Mathematical Thinking at Grade 3

Investigation 2: Sessions 3–4

Investigation 3: Sessions 3 and 4

Things That Come in Groups

Investigation 1: Session 1–4

Investigation 2: Session 1–4

Investigation 3: Sessions 3–5

Investigation 4: Sessions 1–4

Investigation 5: Sessions 1–4

Landmarks in the Hundreds

Investigation 1: Sessions 1–7

Investigation 2: Sessions 1–6

Combining and Comparing  
Investigation 1: Sessions 1 and 2  
Investigation 3: Sessions 1–3  
Investigation 4: Session 2  
Investigation 5: Sessions 1–3

**a. relate skip counting to multiplication;**

Things That Come in Groups  
Investigation 2: Session 1–4  
Investigation 3: Sessions 3 and 4  
Landmarks in the Hundreds  
Investigation 1: Sessions 1–5

**b. connect division to sharing situations;**

Mathematical Thinking at Grade 3  
Investigation 2: Sessions 3–4  
Things That Come in Groups  
Investigation 3: Sessions 3–5  
Investigation 4: Sessions 1–2  
Landmarks in the Hundreds  
Investigation 1: Sessions 6–7

**c. demonstrate multiplication using repeated addition (e.g., arrays);**

Landmarks in the Hundreds  
Investigation 2: Sessions 5–6  
Things That Come in Groups  
Investigation 1: Session 2  
Investigation 2: Session 2  
Investigation 3: Sessions 1–5

**d. write and identify number sentences that describe real-world situations involving addition, subtraction, and multiplication;**

Things That Come in Groups  
Investigation 1: Sessions 1–4  
Investigation 4: Sessions 1–4  
Investigation 5: Sessions 1–4  
Landmarks in the Hundreds  
Investigation 2: Sessions 1–6  
Combining and Comparing  
Investigation 1: Sessions 1 and 2  
Investigation 3: Sessions 1–3  
Investigation 5: Sessions 1–3

**e. write and explain related addition and subtraction sentences.**

- Mathematical Thinking at Grade 3
  - Investigation 3: Sessions 3 and 4
- Combining and Comparing
  - Investigation 4: Session 2

**3.1.3 Solve problems, compute fluently, and make reasonable estimates.**

- Mathematical Thinking at Grade 3
  - Investigation 1: Sessions 1–3
  - Investigation 2: Sessions 1–7
  - Investigation 3: Sessions 3–4
  - Investigation 4: Session 1
- Things That Come in Groups
  - Investigation 1: Session 1–4
  - Investigation 2: Session 1–6
  - Investigation 3: Sessions 2–3
  - Investigation 4: Sessions 1–4
  - Investigation 5: Session 3–4
  - Ten Minute Math: Counting Around the Class
- Flips, Turns, and Area
  - Ten-Minute Math: Broken Calculator
- From Paces to Feet
  - Investigation 1 Sessions 1–4
  - Ten Minute Math: Estimation and Number Sense
- Landmarks in the Hundreds
  - Investigation 1: Sessions 1–7
  - Investigation 2: Sessions 1–6
  - Investigation 3: Sessions 2–3
- Up and Down the Number Line
  - Investigation 1: Sessions 1–4, 6–8
  - Investigation 2: Sessions 1–3
  - Investigation 3: Session 1
- Combining and Comparing
  - Investigation 1: Sessions 1–3
  - Investigation 2: Sessions 1–2
  - Investigation 3: Sessions 1–3
  - Investigation 4: Sessions 1–4
  - Investigation 5: Sessions 1–3
  - Ten-Minute Math: Estimation and Number Sense
- Turtle Paths
  - Investigation 2: Sessions 1–2
- Fair Shares
  - Investigation 1: Sessions 3–4

**a. use a variety of thinking strategies to add and subtract whole numbers (e.g., sums of ten, doubles plus one);**

Mathematical Thinking at Grade 3

Investigation 2: Sessions 1–7

Investigation 3: Sessions 3–4

Investigation 4: Session 1

Combining and Comparing

Investigation 1: Sessions 1–3

Investigation 2: Sessions 1–2

Investigation 3: Sessions 1–3

Investigation 4: Sessions 1–4

Investigation 5: Sessions 1–3

**b. explain the reasonableness of a solution;**

From Paces to Feet

Investigation 1 Sessions 1–4

Ten Minute Math: Estimation and Number Sense

Landmarks in the Hundreds

Investigation 3: Sessions 2–3

Combining and Comparing

Investigation 1: Sessions 1–2

Investigation 3: Sessions 1–3

Investigation 4: Sessions 3–4

Investigation 5: Sessions 1–3

Ten-Minute Math: Estimation and Number Sense

Turtle Paths

Investigation 2: Sessions 1–2

**c. relate adding doubles to multiplying by two;**

Mathematical Thinking at Grade 3

Investigation 2: Sessions 1

Things That Come in Groups

Investigation 1: Session 2

Investigation 2: Session 2

**d. use known multiplication facts to determine a related product (e.g.,  $9 \times 7$  is 7 less than  $10 \times 7$ );**

Things That Come in Groups

Investigation 2: Session 1, 5–6

**e. use the multiplication facts 0, 1, 2, 5, and 10 as a factor;**

Things That Come in Groups

Investigation 1: Sessions 1–4

Investigation 2: Sessions 1–6

Investigation 3: Sessions 2–3

Investigation 5: Session 3–4

Ten Minute Math: Counting Around the Class

Landmarks in the Hundreds

Investigation 1: Sessions 2–7

Investigation 2: Sessions 1–6

Up and Down the Number Line

Investigation 3: Session 1

**f. explain and justify solution strategies in problem solving;**

Mathematical Thinking at Grade 3

Investigation 1: Sessions 1–3

Investigation 3: Sessions 1–4

Investigation 4: Sessions 1–3

Things That Come in Groups

Investigation 1: Sessions 1–4

Investigation 4: Sessions 1–4

Flips, Turns, and Area

Ten-Minute Math: Broken Calculator

Landmarks in the Hundreds

Investigation 1: Sessions 1–7

Investigation 2: Sessions 1–6

Up and Down the Number Line

Investigation 1: Sessions 1–4

Investigation 2: Sessions 1–3

Combining and Comparing

Investigation 2: Session 2

Investigation 3: Sessions 1–3

Investigation 5: Sessions 2–3

**g. select and apply an appropriate problem-solving strategy (e.g., organized list, guess and check, diagram, table);**

Things That Come in Groups

Investigation 5: Session 3–4

Up and Down the Number Line

Investigation 1: Sessions 1–2, 6–8

Fair Shares

Investigation 1: Sessions 3–4

**h. mentally calculate the sum or difference of any two numbers up to 100;**

Up and Down the Number Line

Investigation 1: Sessions 3, 4, 5 (Ten-Minute Math)

Combining and Separating

Investigation 1: Sessions 1–2

Investigation 3: Sessions 1–2

Investigation 4: Sessions 1, 3–4 (Ten-Minute Math)

**i. use strategies to estimate in problem-solving situations.**

From Paces to Feet

Investigation 1: Sessions 2, 5–6 (Ten-Minute Math)

Combining and Separating

Investigation 1: Sessions 1–2

Investigation 3: Sessions 1–2

Investigation 4: Sessions 1, 3–4 (Ten-Minute Math)

**ALGEBRA**

**Content Standard 2.0** The student will understand and generalize patterns as they represent and analyze quantitative relationships and change in a variety of contexts and problems using graphs, tables, and equations.

**3.2.1 Sort and classify objects by size, number, and other properties.**

Mathematical Thinking at Grade 3

Investigation 3: Sessions 1–2

Exploring Solids and Boxes

Investigation 1: Session 1

**a. sort objects by two or more attributes;**

Mathematical Thinking at Grade 3

Investigation 3: Sessions 1–2

Exploring Solids and Boxes

Investigation 1: Session 1

**b. devise, carry out, and explain a sorting scheme for a group of objects;**

Mathematical Thinking at Grade 3

Investigation 3: Sessions 1–2

Exploring Solids and Boxes

Investigation 1: Session 1



**c. identify the rules by which objects or numbers have been sorted.**

Mathematical Thinking at Grade 3  
Investigation 3: Sessions 1–2  
Exploring Solids and Boxes  
Investigation 1: Session 1

**3.2.2 Represent and analyze patterns and functions.**

Mathematical Thinking at Grade 3  
Investigation 1: Sessions 2–3  
Things That Come in Groups  
Investigation 2: Sessions 1–6  
Investigation 3: Session 3  
Investigation 4: Sessions 1–2  
Investigation 5: Sessions 1–4  
Flips, Turns, and Area  
Investigation 1: Sessions 1–3  
From Paces to Feet:  
Investigation 1: Session 2  
Landmarks in the Hundreds  
Ten-Minute Math: Counting Around the Class  
Up and Down the Number Line  
Investigation 2: Sessions 2 and 3  
Fair Shares  
Investigation 2: Sessions 5–6

**a. recognize, describe, extend, translate, and create patterns;**

Mathematical Thinking at Grade 3  
Investigation 1: Sessions 2–3  
Things That Come in Groups  
Investigation 2: Sessions 1–6  
Investigation 3: Session 3  
Investigation 5: Sessions 1, 4  
Flips, Turns, and Area  
Investigation 1: Sessions 1–3  
From Paces to Feet:  
Investigation 1: Session 2  
Landmarks in the Hundreds  
Ten-Minute Math: Counting Around the Class  
Fair Shares  
Investigation 2: Sessions 5–6

**b. describe a growing pattern;**

Things That Come in Groups

Investigation 5: Session 1

Up and Down the Number Line

Investigation 2: Sessions 2 and 3

**c. determine the output for a particular input given a one-operation function rule involving addition, subtraction, or multiplication.**

Things That Come in Groups

Investigation 4: Sessions 1–2

Investigation 5: Sessions 1, 2, 3

**3.2.3 Use concrete, pictorial, and verbal representations to develop an understanding of the language and symbols of mathematics.**

Things That Come in Groups

Investigation 1: Sessions 1–4

Investigation 2: Sessions 3–4

Investigation 4: Sessions 1–4

Investigation 5: Sessions 1–4

Landmarks in the Hundreds

Investigation 1: Sessions 6–7

Investigation 2: Sessions 1–6

Up and Down the Number Line

Investigation 1: Sessions 6–7

Combining and Comparing

Investigation 1: Session 1

Investigation 4: Sessions 2–4

**a. describe the commutative properties of addition and multiplication with words or symbols;***The commutative property can be introduced with these activities.*

Things That Come in Groups

Investigation 3: Sessions 1–5

Combining and Comparing

Investigation 4: Sessions 3 and 4

**b. interpret and solve open sentences that involve addition, subtraction, and multiplication;**

Things That Come in Groups

Investigation 1: Session 3 (See Teacher Note, page 15.)

Investigation 4: Sessions 1–2

Combining and Comparing

Investigation 4: Session 2

**c. use the language and symbols of mathematics appropriately to communicate mathematical thinking;**

*These are some of the many investigations that fulfill this accomplishment.*

Things That Come in Groups

Investigation 1: Sessions 1–4

Investigation 4: Sessions 1–4

Investigation 5: Sessions 1–4

Landmarks in the Hundreds

Investigation 2: Sessions 1–6

Up and Down the Number Line

Investigation 1: Sessions 6–7

**d. demonstrate understanding that an equation is a number sentence stating two quantities are equal.**

Things That Come in Groups

Investigation 1: Sessions 3, 4

Investigation 2: Sessions 3–4

Investigation 4: Sessions 1–2, 3–4

Landmarks in the Hundreds

Investigation 1: Sessions 6–7

Investigation 2: Sessions 5–6

Combining and Comparing

Investigation 1: Session 1

Investigation 4: Session 2

**3.2.4 Illustrate general properties of operations.**

Mathematical Thinking at Grade 3

Investigation 2: Sessions 1–2

Ten-Minute Math: Calendar Math

Things That Come in Groups

Investigation 3: Sessions 1–2, 3–4

Up and Down the Number Line

Investigation 1: Sessions 3–5

Ten-Minute Math: Estimation and Number Sense

**a. apply the commutative property of addition and multiplication;**

Things That Come in Groups

Investigation 3: Sessions 1–2, 3–4

Up and Down the Number Line

Ten-Minute Math: Estimation and Number Sense

**b. show that subtraction is not commutative;**

*This concept can be introduced with this activity*

Up and Down the Number Line

Ten-Minute Math: Estimation and Number Sense

**c. apply the addition and subtraction properties of zero;**

Mathematical Thinking at Grade 3

Investigation 2: Sessions 1–2

Ten-Minute Math: Calendar Math

Up and Down the Number Line

Investigation 1: Sessions 3–5

**d. apply the zero and identity properties of multiplication;**

Mathematical Thinking at Grade 3

Ten-Minute Math: Calendar Math

**e. use arrays to represent the commutative property of multiplication.**

Things That Come in Groups

Investigation 3: Sessions 1–5

**3.2.5 Analyze change in various contexts.**

Combining and Comparing

Investigation 2: Sessions 1, 2

**a. describe qualitative change (e.g., a student growing taller);**

Combining and Comparing

Investigation 2: Session 1

**b. describe quantitative change (e.g., a student growing two inches in one year).**

Combining and Comparing

Investigation 2: Session 2

**GEOMETRY****Content Standard 3.0**

The student will develop an understanding of geometric concepts and relationships as the basis for geometric modeling and reasoning to solve problems involving one-, two-, and three-dimensional figures.

**3.3.1 Analyze characteristics and properties of geometric shapes.**

Flips, Turns, and Area

Investigation 1: Sessions 1–5

Investigation 2: Sessions 1–5

Fair Shares  
Investigation 1: Sessions 1–4  
Investigation 2: Sessions 1–7

Exploring Solids and Boxes  
Investigation 2: Sessions 1–5  
Investigation 5: Sessions 1–4  
Ten-Minute Math: Quick Images

Turtle Paths  
Investigation 1: Sessions 1–4  
Investigation 2: Sessions 1–6  
Investigation 3: Sessions 1–7

**a. recognize, name, build, draw, and compare two- and three-dimensional geometric figures;**

Flips, Turns, and Area  
Investigation 1: Sessions 1–5  
Investigation 2: Sessions 1–5

Fair Shares  
Investigation 1: Sessions 1–4  
Investigation 2: Sessions 1–7

Exploring Solids and Boxes  
Investigation 2: Sessions 1–5  
Investigation 5: Sessions 1–4  
Ten-Minute Math: Quick Images

Turtle Paths  
Investigation 1: Sessions 1–4  
Investigation 2: Sessions 1–6  
Investigation 3: Sessions 1–7

**b. recognize congruent geometric figures;**

Flips, Turns, and Area  
Investigation 1: Session 1  
Investigation 2: Sessions 2–3, 4–5

Turtle Paths  
Investigation 3: Sessions 1–2, 3–5

**c. identify and draw lines of symmetry in two-dimensional designs and shapes;**

Symmetry is covered in detail in Grade 2.

**d. identify and draw horizontal and vertical lines;**

Turtle Paths  
Investigation 1: Session 1  
Investigation 2: Sessions 1–2, 5–6

**e. identify and draw diagonals of polygons.**

Flips, Turns, and Area

Investigation 2: Session 1–3

**3.3.2 Specify locations and describe spatial relationships.**

Turtle Paths

Investigation 1: Sessions 1–4

Investigation 2: Sessions 1–6

Investigation 3: Sessions 1–7

Fair Shares

Investigation 1: Sessions 1–2

**a. identify the position of  $\frac{1}{2}$ ,  $\frac{1}{3}$ , and  $\frac{1}{4}$  on the number line;**

Fair Shares

Investigation 1: Sessions 1–2

**b. identify a location on a grid using whole number coordinates.**

Turtle Paths

Investigation 1: Sessions 1–4

Investigation 2: Sessions 1–6

Investigation 3: Sessions 1–7

**3.3.3 Recognize and apply flips, slides, and turns.**

Flip, Turns, and Area

Investigation 1: Sessions 1, 2–3, 5

Investigation 2: Sessions 2–3

Turtle Paths

Investigation 1: Sessions 1, 3–4

Investigation 2: Sessions 1–2

**a. predict and describe the results of sliding, flipping, and turning in two-dimensional shapes.**

Flip, Turns, and Area

Investigation 1: Sessions 1, 2–3, 5

Investigation 2: Sessions 2–3

Turtle Paths

Investigation 1: Sessions 1, 3–4

Investigation 2: Sessions 1–2

**MEASUREMENT****Content Standard 4.0**

The student will become familiar with the units and processes of measurement in order to use a variety of tools, techniques, and formulas to determine and to estimate measurements in mathematical and real-world problems.

**3.4.1 Demonstrate understanding of units of measure and measurable attributes of objects.**

From Paces to Feet

Investigation 1: Session 2–4

Investigation 2: Session 1

Turtle Paths

Investigation 3: Sessions 1–2, 6–7

Ten-Minute Math: Lengths and Perimeters

Flips, Turns, and Area

Investigation 1: Sessions 1, 2–3, 4–5

Investigation 2: Sessions 2–3, 4–5

**a. determine when an estimate of a measurement is sufficient;**

From Paces to Feet

Investigation 1: Session 2–4

Investigation 2: Session 1

**b. demonstrate understanding of the concepts of perimeter, area, and capacity.**

Turtle Paths

Investigation 3: Sessions 1–2, 6–7

Ten-Minute Math: Lengths and Perimeters

Flips, Turns, and Area

Investigation 1: Sessions 1, 2–3, 4–5

Investigation 2: Sessions 2–3, 4–5

**3.4.2 Apply appropriate techniques and tools to determine measurements.**

From Paces to Feet

Investigation 1: Sessions 1–6

Investigation 2: Sessions 1–7

Investigation 3: Sessions 1–3

Investigation 4: Sessions 1–3

Combining and Comparing

Investigation 2: Sessions 1–2

Investigation 3: Session 2

Investigation 5: Sessions 1–3

## Turtle Paths

Investigation 3: Sessions 1–2, 6–7

Ten-Minute Math: Lengths and Perimeters

- a. **solve real-world problems using a calendar;**  
Combining and Comparing  
Investigation 5: Session 1
- b. **use strategies to estimate length, perimeter, area, capacity, weight, time, and temperature;**  
From Paces to Feet  
Investigation 1: Sessions 1, 2, 3–4
- c. **explain the relationships among inches, feet, and yards;**  
From Paces to Feet  
Investigation 2: Session 1–4
- d. **measure length to the nearest centimeter, foot, half-inch, and inch;**  
From Paces to Feet  
Investigation 1: Sessions 5–6  
Investigation 2: Sessions 1, 2, 3–4, 5, 6–7  
Investigation 4: Sessions 1–3
- e. **measure the capacity of a container in liters, cups, pints, quarts, and gallons;**  
*Related content:*  
Combining and Comparing  
Investigation 4: Session 1
- f. **measure to the nearest ounce, pound, kilogram, and gram;**  
*Pounds and kilograms are introduced in grade 5. The following investigation involves the concept of weight with a pan balance.*  
Combining and Comparing  
Investigation 2: Sessions 1, 2
- g. **find the perimeter of polygons;**  
Turtle Paths  
Investigation 3: Sessions 1–2, 6–7  
Ten-Minute Math: Lengths and Perimeters



**h. select and apply appropriate standard units to measure length, area, capacity, weight, time, and temperature.**

From Paces to Feet

Investigation 1: Sessions 1–6

Investigation 2: Sessions 1–7

Investigation 3: Sessions 1–3

Investigation 4: Sessions 1–3

Combining and Comparing

Investigation 2: Sessions 1–2

Investigation 3: Session 2

Investigation 5: Sessions 1–3

**i. solve real-world problems involving measurement and elapsed time to the half-hour;**

Combining and Comparing

Investigation 2: Sessions 1–2

Investigation 3: Session 3

From Paces to Feet

Investigation 2: Sessions 1–7

Investigation 3: Sessions 1–3

**j. read thermometers with Fahrenheit and Celsius scales;***Related content:*

Up and Down the Number Line

Investigation 1: Session 1–2, 8

**k. read and write time up to five-minute intervals.**

Combining and Comparing

Investigation 3: Session 2

Investigation 5: Sessions 1, 2–3

**DATA ANALYSIS AND PROBABILITY****Content Standard 5.0**

The student will understand and apply basic statistical and probability concepts as they, organize, and analyze data, and to make predictions and conjectures.

**3.5.1 Develop, select, and use appropriate methods to collect, organize, display, and analyze data.**

Mathematical Thinking at Grade 3

Investigation 2: Sessions 3–4

Investigation 3: Sessions 1–4

Ten-Minute Math

Things That Come in Groups  
Investigation 5: Sessions 1, 3, 4

From Paces to Feet  
Investigation 1: Sessions 1–2, 5–6  
Investigation 2: Sessions 2–4  
Investigation 3: Sessions 1–3

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

Combining and Comparing  
Investigation 4: Session 1  
Investigation 5: Sessions 2–3

Ten-Minute Math: Exploring Data

**a. pose questions and gather data to answer questions;**

Mathematical Thinking at Grade 3  
Investigation 3: Sessions 3–4

Combining and Comparing  
Investigation 5: Sessions 2–3  
Ten-Minute Math

**b. read, interpret, and create tables using tally marks;**

Mathematical Thinking at Grade 3  
Investigation 3: Sessions 1–2

**c. create pictographs and bar graphs;**

Mathematical Thinking at Grade 3  
Investigation 3: Sessions 3–4  
Ten-Minute Math

Things That Come in Groups  
Investigation 5: Sessions 1, 3

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

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

**d. read and interpret tables, bar graphs, and pictographs.**

Mathematical Thinking at Grade 3  
Investigation 2: Sessions 3–4  
Investigation 3: Sessions 1–4

Things That Come in Groups  
Investigation 5: Sessions 1, 3, 4

From Paces to Feet  
Investigation 1: Sessions 1–2, 5–6  
Investigation 2: Sessions 2–4  
Investigation 3: Sessions 1–3  
Combining and Comparing  
Investigation 4: Session 1  
Ten-Minute Math: Exploring Data

**3.5.2 Apply the basic concepts of probability.**

Things That Come In Groups  
Ten-Minute Math: Likely or Unlikely  
From Paces to Feet  
Investigation 3: Sessions 2 and 3  
Combining and Comparing  
Investigation 2: Session 1  
Exploring Solids and Boxes  
Ten-Minute Math: Likely or Unlikely

**a. make and justify predictions based on data gathered and displayed;**

From Paces to Feet  
Investigation 3: Sessions 2 and 3  
Combining and Comparing  
Investigation 2: Session 1

**b. identify all possible outcomes of a simple experiment (e.g., spinner, coin toss, number cubes);**

*Related content:*  
Things That Come In Groups  
Ten-Minute Math: Likely or Unlikely  
Exploring Solids and Boxes  
Ten-Minute Math: Likely or Unlikely

**c. explain whether an event is certain, possible, or impossible;**

*Related content:*  
Things That Come In Groups  
Ten-Minute Math: Likely or Unlikely  
Exploring Solids and Boxes  
Ten-Minute Math: Likely or Unlikely

**d. explain whether an event is likely or unlikely.**

Things That Come In Groups

Ten-Minute Math: Likely or Unlikely

Exploring Solids and Boxes

Ten-Minute Math: Likely or Unlikely

**Investigations in Number, Data, & Space  
to the  
Tennessee Curriculum Standards,  
Learning Expectations, and Accomplishments  
Grade Four**

**NUMBER AND OPERATIONS**

**Content Standard 1.0** The student will develop number and operation sense needed to represent numbers and number relationships verbally, symbolically, and graphically and to compute fluently and make reasonable estimates in problem solving.

**4.1.1 Understand numbers, ways of representing numbers, relationships among numbers, and number systems.**

Mathematical Thinking at Grade 4

Investigation 1: Session 1–3

Investigation 2: Sessions 1

Investigation 3: Sessions 4–5

Arrays and Shares

Investigation 1: Sessions 1–3

Investigation 2: Sessions 1–8

Investigation 3: Sessions 1–5

Landmarks in the Thousands

Investigation 2: Sessions 1, 5

Investigation 3: Sessions 1–2

Investigation 4: Sessions 1–3

Different Shapes, Equal Pieces

Investigation 1: Sessions 1–5

Investigation 2: Sessions 1–4

Investigation 3: Sessions 1–3

The Shape of the Data

Investigation 2: Session 5–7

Money, Miles, and Large Numbers

Investigation 1: Sessions 1–2, 4–6, 7–8

Investigation 2: Sessions 1–2, 4

Investigation 3: Sessions 2–4

Changes Over Time

Investigation 1: Sessions 5–6

Packages and Groups

Investigation 1: Sessions 1–2

Investigation 2: Sessions 1–3

Investigation 3: Sessions 1–6

Sunken Ships and Grid Patterns  
Investigation 1: Sessions 2–4  
Three of the Four, Like Spaghetti  
Investigation 1: Sessions 2–4  
Investigation 2: Sessions 5–7

**a. read and write numbers from hundredths to hundred-thousands;**

Mathematical Thinking at Grade 4  
Investigation 1: Session 1–3  
Arrays and Shares  
Investigation 1: Sessions 1–3  
Landmarks in the Thousands  
Investigation 4: Sessions 1–3  
Different Shapes, Equal Pieces  
Investigation 1: Sessions 2–4  
The Shape of the Data  
Investigation 2: Session 5–7  
Money, Miles, and Large Numbers  
Investigation 1: Sessions 1–2  
Changes Over Time  
Investigation 1: Sessions 5–6  
Packages and Groups  
Investigation 2: Sessions 1–3  
Sunken Ships and Grid Patterns  
Investigation 1: Sessions 2–4

**b. recognize the place value of a given digit from hundredths to hundred-thousands;**

Mathematical Thinking at Grade 4  
Investigation 1: Session 1  
Investigation 2: Sessions 1  
Landmarks in the Thousands  
Investigation 3: Sessions 1–2  
Investigation 4: Sessions 1–3  
Money, Miles, and Larger Numbers  
Investigation 1 : Sessions 1–2, 4–6  
Investigation 2 : Sessions 1–2, 4

- c. compare and order whole numbers using the appropriate symbols (i.e.,  $>$ ,  $<$ ,  $=$ );**  
*These investigations provide opportunities for students to compare and order whole numbers.*  
Landmarks in the Thousands  
Investigation 3: Sessions 1, 2  
Investigation 4: Sessions 1–3
- d. model fractions as parts of unit wholes, as part of a set, as locations on number lines, and as divisions of whole numbers;**  
Different Shapes, Equal Pieces  
Investigation 1: Sessions 1–5  
Investigation 2: Sessions 1–4  
Investigation 3: Sessions 1–2
- e. recognize and generate equivalent forms of whole numbers and commonly used fractions and decimals;**  
Different Shapes, Equal Pieces  
Investigation 1: Session 5  
Investigation 2: Sessions 1–4  
Three Out of Four Like Spaghetti  
Investigation 1: Sessions 2–3
- f. use models to compare and order commonly used fractions;**  
Different Shapes, Equal Pieces  
Investigation 1: Sessions 2–4  
Investigation 2: Sessions 1–2  
Investigation 3: Session 3  
Three Out of Four Like Spaghetti  
Investigation 1: Session 3  
Investigation 2: Sessions 5–7
- g. use concrete and pictorial representations to compare decimals;**  
Money, Miles, and Large Numbers  
Investigation 1: Sessions 6, 7–8  
Investigation 2: Sessions 1–2, 4
- h. use various models to represent, order, and compare whole numbers and commonly used fractions and mixed numbers (e.g., number lines, base ten blocks, Venn diagrams, hundreds boards);**  
Different Shapes, Equal Pieces  
Investigation 1: Sessions 2–4  
Investigation 2: Sessions 1–2  
Investigation 3: Session 3

Three Out of Four Like Spaghetti

Investigation 1: Session 3

Investigation 2: Sessions 5–7

*These investigations provide opportunities for students to compare and order whole numbers.*

Landmarks in the Thousands

Investigation 3: Sessions 1, 2

Investigation 4: Sessions 1–3

**i. communicate and use mathematical language and symbols correctly.**

Mathematical Thinking at Grade 4

Investigation 3: Sessions 4–5

Arrays and Shares

Investigation 2: Sessions 1–8

Investigation 3: Sessions 1–5

Landmarks in the Thousands

Investigation 2: Sessions 1, 5

Money, Miles, and Large Numbers

Investigation 1: Sessions 1–2, 7–8

Investigation 2: Sessions 1–2, 4

Investigation 3: Sessions 2–4

Packages and Groups

Investigation 1: Sessions 1–2

Investigation 3: Sessions 1–6

Three of the Four, Like Spaghetti

Investigation 1: Sessions 3–4

**4.1.2 Understand meanings of operations and how they relate to one another.**

Mathematical Thinking at Grade 4

Investigation 2: Session 1

Investigation 3: Session 3–5

Landmarks in the Thousands

Investigation 2: Sessions 1,5

Money, Miles, and Large Numbers

Investigation 1 : Session 6

Packages and Groups

Investigation 1: Sessions 4–5

Investigation 3: Sessions 1–2, 4–6

Different Shapes, Equal Pieces

Investigation 3: Session 1–2

Arrays and Shares

Investigation 2: Sessions 2–3



- a. explain the relationship between addition and subtraction;**  
Mathematical Thinking at Grade 4  
Investigation 3: Session 3–5  
Money, Miles, and Large Numbers  
Investigation 1 : Session 6
- b. explain the relationship between multiplication and division;**  
Landmarks in the Thousands  
Investigation 2: Sessions 1,5  
Packages and Groups  
Investigation 3: Sessions 1–2
- c. communicate the effects of addition, subtraction, multiplication, and division on size and order of numbers.**  
*These are a few of the many examples of this accomplishment.*  
Mathematical Thinking at Grade 4  
Investigation 2: Session 1  
Packages and Groups  
Investigation 1: Sessions 4–5  
Investigation 3: Sessions 4–6  
Different Shapes, Equal Pieces  
Investigation 3: Session 1–2  
Arrays and Shares  
Investigation 2: Sessions 2–3

**4.1.3 Solve problems, compute fluently, and make reasonable estimates.**

- Mathematical Thinking at Grade 4  
Investigation 1: Sessions 1–4  
Investigation 2: Sessions 1–4  
Investigation 3: Session 4  
Ten-Minute Math: Estimation and Number Sense
- Arrays and Shares  
Investigation 1: Session 3  
Investigation 2: Session 7–8  
Investigation 3: Session 2–4
- Landmarks in the Thousands  
Investigation 2: Session 1  
Investigation 3: Sessions 3–5
- Different Shapes, Equal Pieces  
Investigation 1: Session 1–5  
Investigation 2: Session 1–4

The Shape of the Data  
Ten-Minute Math: Estimation and Number Sense

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

Changes Over Time  
Investigation 1: Sessions 1–2, 5–6  
Investigation 3: Sessions 1–8

Packages and Groups  
Investigation 1: Sessions 4–5  
Investigation 2: Sessions 2–3  
Investigation 3: Session 1–6, 10

Three Out of Four Like Spaghetti  
Investigation 1 : Sessions 1–4  
Investigation 2 : Sessions 5–7

**a. use strategies to estimate the results of whole-number computations;**

Landmarks in the Thousands  
Investigation 3: Sessions 3–5

Money, Miles, and Large Numbers  
Investigation 3: Session 1

**b. explain the reasonableness of results;**

Mathematical Thinking at Grade 4  
Investigation 1: Sessions 1–4  
Investigation 2: Sessions 3–4  
Ten-Minute Math: Estimation and Number Sense

Landmarks in the Thousands  
Investigation 3: Sessions 3–5

The Shape of the Data  
Ten-Minute Math: Estimation and Number Sense

Money, Miles, and Large Numbers  
Investigation 1: Sessions 1–2, 7–8  
Investigation 2: Sessions 1–3  
Investigation 3: Session 1

Packages and Groups  
Investigation 1: Sessions 4–5  
Investigation 2: Sessions 2–3

- c. add and subtract fractions with like denominators;**  
Different Shapes, Equal Pieces  
Investigation 1: Session 1–5  
Investigation 2: Session 1–4
- d. multiply and divide efficiently and accurately with single-digit whole numbers;**  
Mathematical Thinking at Grade 4  
Investigation 3: Session 4  
Arrays and Shares  
Investigation 1: Session 3  
Investigation 2: Session 7–8  
Investigation 3: Session 2–4  
Landmarks in the Thousands  
Investigation 2: Session 1  
Packages and Groups  
Investigation 3: Session 4–6
- e. add, subtract, and multiply decimals (includes monetary units);**  
Mathematical Thinking at Grade 4  
Investigation 2: Sessions 1–2, 3–4  
Money, Miles, and Large Numbers  
Investigation 1: Sessions 1–2
- f. select appropriate methods and tools for computing with whole numbers (e.g., mental computation, estimation, calculators, paper and pencil, guess and check);**  
Mathematical Thinking at Grade 4  
Investigation 1: Sessions 1–4  
Investigation 2: Sessions 1–4  
Ten-Minute Math: Estimation and Number Sense  
Landmarks in the Thousands  
Investigation 2: Session 1  
Investigation 3: Sessions 3–5  
Money, Miles, and Large Numbers  
Investigation 1: Sessions 1–2, 4–5, 7–8  
Investigation 2: Session 3  
Investigation 3: Sessions 1–4  
Packages and Groups  
Investigation 1: Sessions 4–5  
Investigation 2: Sessions 2–3  
Investigation 3: Sessions 4–6

**g. solve real-world problems involving one-step addition, subtraction, and multiplication;**

Mathematical Thinking at Grade 4

Blackline Masters: Practice Pages E–G

Different Shapes, Equal Pieces

Blackline Masters: Practice Pages A–F

Money, Miles, and Large Numbers

Investigation 1: Sessions 1–3, 6

Investigation 2: Session 4

Investigation 3: Sessions 2–4

Packages and Groups

Investigation 3: Sessions 1–2, 4–6

Three Out of Four Like Spaghetti

Investigation 1: Session 4

**h. identify missing information and/or too much information in real-world problems;**

Changes Over Time

Investigation 1: Sessions 5–6

**i. apply logical reasoning to solve real-world problems;**

Mathematical Thinking at Grade 4

Blackline Masters: Practice Pages A–D

Different Shapes, Equal Pieces

Blackline Masters: Practice Pages A–C

Money, Miles, and Large Numbers

Investigation 1: Sessions 1–2

Investigation 2: Sessions 1–2

Changes Over Time

Investigation 1: Sessions 1–2

Investigation 3: Sessions 1–8

Packages and Groups

Investigation 3: Sessions 1–2 (See page 39.)

**j. select the appropriate computational and operational method to solve problems;**

Mathematical Thinking at Grade 4

Investigation 1: Sessions 1–4

Investigation 2: Sessions 1–4

Ten-Minute Math: Estimation and Number Sense

Landmarks in the Thousands

Investigation 2: Session 1

Investigation 3: Sessions 3–5

- Money, Miles, and Large Numbers
  - Investigation 1: Sessions 1–2, 4–5, 7–8
  - Investigation 2: Session 3
  - Investigation 3: Sessions 1–4
- Packages and Groups
  - Investigation 1: Sessions 4–5
  - Investigation 2: Sessions 2–3
  - Investigation 3: Sessions 4–6

**k. solve real-world problems using whole numbers, fractions, and decimals.**

- Arrays and Shapes
  - Investigation 2: Sessions 7–8
  - Investigation 3: Sessions 2–4
- Different Shapes, Equal Pieces
  - Investigation 1: Sessions 1–5
  - Investigation 2: Sessions 1–4
- Money, Miles, and Large Numbers
  - Investigation 2: Sessions 1–4
- Packages and Groups
  - Investigation 3 : Sessions 1–6, 10
- Three of the Four Like Spaghetti
  - Investigation 1 : Sessions 1–4
  - Investigation 2 : Sessions 5–7

## **ALGEBRA**

**Content Standard 2.0** The student will understand and generalize patterns as they represent and analyze quantitative relationships and change in a variety of contexts and problems using graphs, tables, and equations.

**4.2.1 Understand patterns, relations, and functions.**

- Mathematical Thinking at Grade 4
  - Investigation 4: Sessions 1, 2, 3–4
- Packages and Groups
  - Investigation 1: Sessions 1–2
  - Investigation 3: Sessions 4–6
- Sunken Ships and Grid Patterns
  - Investigation 1: Sessions 3–4, 5–6
  - Investigation 2: Sessions 2–3, 8–9
- Changes Over Time
  - Investigation 1: Sessions 5–6

## Arrays and Shares

Investigation 1: Sessions 1–2, 3

Investigation 3: Sessions 2–4

Ten-Minute Math

**a. generalize and extend geometric and numerical patterns;**

## Arrays and Shares

Investigation 1: Sessions 1–2, 3

Investigation 3: Sessions 2–4

Ten-Minute Math

## Packages and Groups

Investigation 1: Sessions 1–2

Investigation 3: Sessions 4–6

## Sunken Ships and Grid Patterns

Investigation 1: Sessions 3–4, 5–6

**b. represent and analyze patterns and functions using words, tables, and graphs;**

## Arrays and Shares

Investigation 1: Sessions 1–2, 3

Investigation 3: Sessions 2–4

Ten-Minute Math

## Packages and Groups

Investigation 1: Sessions 1–2

Investigation 3: Sessions 4–6

## Sunken Ships and Grid Patterns

Investigation 1: Sessions 3–4, 5–6

**c. identify and describe a function rule.**

## Mathematical Thinking at Grade 4

Investigation 4: Sessions 1, 2, 3–4

## Packages and Groups

Investigation 1: Sessions 1–2

Investigation 3: Sessions 4–6

## Sunken Ships and Grid Patterns

Investigation 1: Sessions 3–4, 5–6

Investigation 2: Sessions 2–3, 8–9

## Changes Over Time

Investigation 1: Sessions 5–6

**4.2.2 Represent and analyze mathematical situations and structures using algebraic symbols.**

- Mathematical Thinking at Grade 4
  - Investigation 1: Session 4
  - Investigation 2: Sessions 1, 3–4
- Arrays and Shares
  - Investigation 2: Sessions 1, 2–3, 7–8
  - Investigation 3: Sessions 2–4
- Landmarks in the Thousands
  - Investigation 2: Session 5
- Money, Miles, and Large Numbers
  - Investigation 1: Session 3
- Changes Over Time
  - Investigation 1: Sessions 5–6
- Packages and Groups
  - Investigation 3: Sessions 1–2, 4–6

**a. interpret and solve open sentences that involve addition, subtraction, multiplication, and division;**

- Mathematical Thinking at Grade 4
  - Investigation 1: Session 4
- Arrays and Shares
  - Investigation 2: Sessions 1, 2–3, 7–8
  - Investigation 3: Sessions 2–4
- Landmarks in the Thousands
  - Investigation 2: Session 5
- Money, Miles, and Large Numbers
  - Investigation 1: Session 3
- Packages and Groups
  - Investigation 3: Sessions 1–2, 4–6

**b. represent the idea of a variable as an unknown quantity using a letter or a symbol;**

- Changes Over Time
  - Investigation 1: Sessions 5–6

**c. demonstrate an understanding that an equation is a number sentence stating two quantities are equal.**

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

**4.2.3 Illustrate general properties of operations.**

Mathematical Thinking at Grade 4

Ten-Minute Math: Estimation and Number Sense

Arrays and Shares

Investigation 2: Sessions 2–6

Investigation 3: Sessions 1–5

Changes Over Time

Investigation 1: Sessions 5–6

Packages and Groups

Investigation 2: Sessions 1–3

Investigation 3: Sessions 3–8

**a. apply commutative, associative, zero, and identity properties.**

Mathematical Thinking at Grade 4

Ten-Minute Math: Estimation and Number Sense

Arrays and Shares

Investigation 2: Sessions 2–6

Investigation 3: Sessions 1–5

Changes Over Time

Investigation 1: Sessions 5–6

Packages and Groups

Investigation 2: Sessions 1–3

Investigation 3: Sessions 3–8

**4.2.4 Analyze change in various contexts.**

Changes Over Time

Investigation 1: Sessions 1–2, 3–4

Investigation 3: Sessions 1–2, 6–7

**a. investigate how a change in one variable relates to a change in a second variable.**

Changes Over Time

Investigation 1: Sessions 1–2, 3–4

Investigation 3: Sessions 1–2, 6–7



**GEOMETRY****Content Standard 3.0**

The student will develop an understanding of geometric concepts and relationships as the basis for geometric modeling and reasoning to solve problems involving one-, two-, and three-dimensional figures.

**4.3.1 Analyze characteristics and properties of two- and three-dimensional shapes.**

Mathematical Thinking at Grade 4

Investigation 4: Sessions 1, 2, 3–4, 5–6

Sunken Ships and Grid Patterns

Investigation 1: Sessions 3–4, 5–6

Investigation 2: Sessions 1–9

Seeing Solids and Silhouettes

Investigation 1: Sessions 1, 2

Investigation 2: Sessions 1–2, 3–4, 5

Investigation 3: Session 1

Different Shapes, Equal Pieces

Investigation 1: Sessions 1–4

Investigation 2: Sessions 1–3

**a. identify, compare, and analyze attributes of two- and three-dimensional shapes;**

Sunken Ships and Grid Patterns

Investigation 2: Sessions 1, 6–7

Seeing Solids and Silhouettes

Investigation 1: Sessions 1, 2

Investigation 2: Sessions 1–2, 3–4, 5

Investigation 3: Session 1

**b. develop and use mathematical language to describe the attributes of geometric figures;**

Sunken Ships and Grid Patterns

Investigation 2: Sessions 1, 6–7

Seeing Solids and Silhouettes

Investigation 1: Sessions 1, 2

Investigation 2: Sessions 1–2, 3–4, 5

Investigation 3: Session 1

- c. draw points, lines, line segments, rays, and angles;**  
Sunken Ships and Grid Patterns  
Investigation 1: Sessions 3–4, 5–6  
Investigation 2: Sessions 1, 2–3, 5, 6–7
- d. describe characteristics of lines and angles (e.g., parallel, perpendicular, intersecting, right, acute, obtuse);**  
Sunken Ships and Grid Patterns  
Investigation 1: Sessions 5–6  
Investigation 2: Sessions 1–7
- e. describe and compare properties of two- and three-dimensional geometric figures;**  
Sunken Ships and Grid Patterns  
Investigation 2: Sessions 1, 6–7  
Seeing Solids and Silhouettes  
Investigation 1: Sessions 1, 2  
Investigation 2: Sessions 1–2, 3–4, 5  
Investigation 3: Session 1
- f. investigate and describe the results of subdividing and combining two-dimensional geometric figures;**  
Different Shapes, Equal Pieces  
Investigation 1: Sessions 1–4  
Investigation 2: Sessions 1–3
- g. recognize congruent geometric figures;**  
Different Shapes, Equal Pieces  
Investigation 1: Sessions 1, 2–4  
Investigation 2: Sessions 1–2
- h. draw lines of symmetry for two-dimensional geometric figures.**  
Mathematical Thinking at Grade 4  
Investigation 4: Sessions 1, 2, 3–4, 5–6  
Sunken Ships and Grid Patterns  
Investigation 2: Sessions 2–3, 6–7, 8–9

#### **4.3.2 Specify locations and describe spatial relationships using coordinate geometry.**

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

- a. use appropriate mathematical language to find and specify points on a grid using whole number coordinates.**

Sunken Ships and Grid Patterns

Investigation 1: Sessions 1–6

Investigation 2: Sessions 1–9

Ten-Minute Math: Lengths and Perimeters

#### **4.3.3 Apply transformations and use symmetry to analyze mathematical situations.**

Mathematical Thinking at Grade 4

Investigation 4: Sessions 1–2, 5–6

Sunken Ships and Grid Patterns

Investigation 2: Sessions 1–9

Different Shapes, Equal Pieces

Investigation 1: Sessions 1–4

Investigation 2: Sessions 1–2

- a. investigate, predict, and describe the results of transformations of two-dimensional geometric figures (i.e., slides, flips, turns);**

Mathematical Thinking at Grade 4

Investigation 4: Sessions 1–2, 5–6

Sunken Ships and Grid Patterns

Investigation 2: Sessions 1–9

- b. describe a motion that will show that two shapes are congruent.**

Different Shapes, Equal Pieces

Investigation 1: Sessions 1–4

Investigation 2: Sessions 1–2

Sunken Ships and Grid Patterns

Investigation 2: Sessions 6–9

#### **4.3.4 Use visualization, spatial reasoning, and geometric modeling to solve problems.**

Mathematical Thinking at Grade 4

Investigations 1–6

Seeing Solids and Silhouettes

Investigation 1: Sessions 1, 2

Investigation 2: Sessions 1–2, 3–4, 5

Investigation 3: Session 1

Investigation 4: Sessions 1–4

Sunken Ships and Grid Patterns

Investigation 2: Sessions 1–4, 6–9

Investigation 1: Sessions 3–4, 5–6

- a. construct and draw two- and three-dimensional geometric figures;**  
Seeing Solids and Silhouettes  
Investigation 1: Sessions 1, 2  
Investigation 2: Sessions 1–2, 3–4, 5  
Investigation 3: Session 1  
Sunken Ships and Grid Patterns  
Investigation 2: Sessions 1, 4, 6–9
- b. create and describe mental images of objects, patterns, and paths;**  
Mathematical Thinking at Grade 4  
Investigation 1–6  
Seeing Silhouettes and Solids  
Investigation 1: Session 2  
Investigation 2: Sessions 3–4  
Sunken Ships and Grid Patterns  
Investigation 1: Sessions 3–4, 5–6  
Investigation 2: Sessions 2–3, 8–9
- c. use geometric models to solve real-world problems.**  
Seeing Solids and Silhouettes  
Investigation 2: Sessions 3–5  
Investigation 3: Session 1  
Investigation 4: Sessions 1–4

## **MEASUREMENT**

### **Content Standard 4.0**

The student will become familiar with the units and processes of measurement in order to use a variety of tools, techniques, and formulas to determine and to estimate measurements in mathematical and real-world problems.

#### **4.4.1 Understand measurable attributes of objects and the units, systems, and processes of measurement.**

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

Seeing Solids and Silhouettes  
Investigation 1: Session 1  
The Shape of Data  
Investigation 2: Sessions 2–3  
Changes Over Time  
Unit Preparation: Preparation Session 3

**a. demonstrate understanding of the concepts of length, perimeter, area, weight, capacity, volume, time, and angle measure;**

Arrays and Shares  
Investigation 2: Sessions 1–6  
Different Shapes, Equal Pieces  
Investigation 1: Sessions 1–5  
Investigation 2: Sessions 1–4  
Sunken Ships and Grid Patterns  
Investigation 2: Session 4  
Ten-Minute Math: Lengths and Perimeters  
Seeing Solids and Silhouettes  
Investigation 1: Session 1  
The Shape of Data  
Investigation 2: Sessions 2–3  
Money, Miles, and Large Numbers  
Investigation 2: Session 4  
Investigation 3: Sessions 2–4  
Changes Over Time  
Unit Preparation: Preparation Session 3

**b. apply appropriate estimation strategies using standard units of measure;**  
*Estimation strategies for units of measure can be introduced with these activities.*

The Shape of the Data  
Investigation 2: Sessions 2–4  
Money, Miles, and Large Numbers  
Investigation 2: Session 4  
Investigation 3: Sessions 2–4  
Changes Over Time  
Investigation 3: Session 3

**c. demonstrate understanding that measurements are approximations;**

Money, Miles, and Large Numbers  
Investigation 2: Session 4  
Investigation 3: Sessions 2–4

- d. demonstrate understanding of the relationships among the units within a system of linear measurement;**  
Money, Miles, and Large Numbers  
Investigation 2: Sessions 1–2, 3
- e. explore perimeter and area using a variety of models (e.g., geoboards, graph paper).**  
Arrays and Shares  
Investigation 2: Sessions 1–6  
Different Shapes, Equal Pieces  
Investigation 1: Sessions 1–5  
Investigation 2: Sessions 1–4  
Sunken Ships and Grid Patterns  
Investigation 2: Session 4  
Ten-Minute Math: Lengths and Perimeters

**4.4.2 Apply appropriate techniques, tools, and formulas to determine measurements.**

- Different Shapes, Equal Pieces  
Investigation 1: Session 1  
Investigation 2: Sessions 1–4
- The Shape of Data  
Investigation 2: Sessions 1–3
- Money, Miles, and Large Numbers  
Investigation 2: Session 4  
Investigation 3: Sessions 2–4
- Changes Over Time  
Unit Preparation Session 3  
Investigation 3: Session 3
- Sunken Ships and Grid Patterns  
Ten-Minute Math: Lengths and Perimeters
- a. select and use tools to measure weight and volume;**  
*Related content involving square units and solids:*  
Seeing Solids and Silhouettes  
Investigation 4
- b. measure length to the nearest  $\frac{1}{4}$  inch;**  
The Shape of Data  
Investigation 2: Sessions 2–3  
Changes Over Time  
Unit Preparation: Preparation Session 3

**c. tell time to the nearest minute;**

*This investigation provides the opportunity for students to apply this accomplishment.*

The Shape of the Data

Investigation 3: Sessions 1–5

**d. read and record temperature using Fahrenheit and Celsius scales;**

Students do not investigate reading and recording temperature.

**e. develop strategies for estimating the perimeters and areas of geometric figures;**

Different Shapes, Equal Pieces

Investigation 1: Session 1

Investigation 2: Sessions 1–4

Sunken Ships and Grid Patterns

Ten-Minute Math: Lengths and Perimeters

**f. apply the formula for finding the area of a rectangle;**

Different Shapes, Equal Pieces

Investigation 1: Sessions 1, 2–4

**g. solve real-world problems involving measurement and elapsed time to the quarter hour.**

The Shape of Data

Investigation 2: Sessions 1–3

Money, Miles, and Large Numbers

Investigation 2: Session 4

Investigation 3: Sessions 2–4

Changes Over Time

Unit Preparation Session 3

Investigation 3: Session 3

**DATA ANALYSIS AND PROBABILITY****Content Standard 5.0**

The student will understand and apply basic statistical and probability concepts as they, organize, and analyze data, and to make predictions and conjectures.

**4.5.1 Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer questions.**

The Shape of the Data

Investigation 1: Sessions 1–3

Investigation 2: Sessions 1–7

Investigation 3: Sessions 1–5

## Changes Over Time

Unit Preparation: Sessions 1–3

Investigation 1: Sessions 1–6

Investigation 2: Sessions 1–2

Investigation 3: Sessions 1–8

## Sunken Ships and Grid Patterns

Investigation 1: Sessions 1–6

Investigation 2: Sessions 1–9

## Three Out of Four Like Spaghetti

Investigation 1: Sessions 1–3

Investigation 2: Sessions 1–7

**a. collect data using observations, surveys, and experiments;**

## The Shape of the Data

Investigation 1: Sessions 1–3

Investigation 2: Sessions 1–7

Investigation 3: Sessions 1–5

## Changes Over Time

Unit Preparation: Sessions 1–3

Investigation 1: Sessions 1–6

Investigation 2: Sessions 1–2

Investigation 3: Sessions 1–8

## Three Out of Four Like Spaghetti

Investigation 1: Sessions 1, 3

Investigation 2: Sessions 1–7

**b. understand how data-collection methods affect the nature of the data set;**

## The Shape of the Data

Investigation 2: Sessions 1–3

Investigation 3: Sessions 1–2

## Changes Over Time

Unit Preparation: Preparation Session 3

## Three Out of Four Like Spaghetti

Investigation 2: Session 3

**c. represent data using tables, pictographs, line graphs, and bar graphs;**

## The Shape of the Data

Investigation 2: Sessions 2–7

Investigation 3: Sessions 3–5

## Changes Over Time

Investigation 1: Sessions 1–4

Investigation 3: Sessions 1–8



Sunken Ships and Grid Patterns  
Investigation 1: Sessions 1–6  
Investigation 2: Sessions 1–9  
Three Out of Four Like Spaghetti  
Investigation 1: Session 2

**d. interpret data displayed in tables, pictographs, line graphs, and bar graphs;**

The Shape of Data

Investigation 1: Sessions 1  
Investigation 2: Sessions 1, 4  
Investigation 3: Sessions 1–2, 3–5

Changes Over Time

Investigation 1: Sessions 1–2, 3–4  
Investigation 3: Sessions 1–8

Three Out of Four Like Spaghetti

Investigation 2: Sessions 5–7

**e. evaluate how well various representations show the collected data.**

Changes Over Time

Investigation 1, Sessions 1–2, 3–4

Three Out of Four Like Spaghetti

Investigation 2: Sessions 2–3  
Investigation 3, Sessions 1–5

**4.5.2 Select and use appropriate statistical methods to analyze data.**

The Shape of the Data

Investigation 2: Sessions 4, 5, 6–7  
Investigation 3: Session 1–3

**a. explore measures of central tendency (i.e., mean, median, mode).**

The Shape of the Data

Investigation 2: Sessions 4, 5, 6–7  
Investigation 3: Session 1–3

**4.5.3 Make and justify predictions based on data.**

The Shape of Data

Investigation 1: Sessions 1–3  
Investigation 2: Sessions 1–3, 4

Three Out of Four Like Spaghetti

Investigation 2: Sessions 2, 3

**a. make predictions based on data;**

The Shape of the Data

Investigation 1: Sessions 2–3  
Investigation 2: Sessions 2–3, 4

**b. design investigations to address a question.**

The Shape of Data

Investigation 1: Sessions 1–3

Investigation 2: Sessions 1–3

Three Out of Four Like Spaghetti

Investigation 2: Sessions 2, 3

**4.5.4 Understand and apply basic concepts of probability.**

Landmarks in the Thousands

Investigation 3: Sessions 3–5

Investigation 4: Sessions 1–3

Ten-Minute Math

Money, Miles, and Large Numbers

Investigation 1: Session 3

Investigation 2: Sessions 7–8

Investigation 3: Session 1

Ten-Minute Math

Three Out of Four Like Spaghetti

Investigation 1: Session 3

Investigation 2: Session 2

Ten-Minute Math

**a. describe the likelihood or chance of events as certain, possible, or impossible;***Related content:*

Landmarks in the Thousands

Investigation 3: Sessions 3–5

Investigation 4: Sessions 1–3

Ten-Minute Math

Money, Miles, and Large Numbers

Investigation 1: Session 3

Investigation 2: Sessions 7–8

Investigation 3: Session 1

Ten-Minute Math

**b. explain whether an event is likely or unlikely;**

Landmarks in the Thousands

Investigation 3: Sessions 3–5

Investigation 4: Sessions 1–3

Ten-Minute Math

Money, Miles, and Large Numbers

Investigation 1: Session 3

Investigation 2: Sessions 7–8

Investigation 3: Session 1

Ten-Minute Math

**c. predict the probability of outcomes of simple experiments.**

Three Out of Four Like Spaghetti

Investigation 1: Session 3

Investigation 2: Session 2

Ten-Minute Math

**Investigations in Number, Data, & Space  
to the  
Tennessee Curriculum Standards,  
Learning Expectations, and Accomplishments  
Grade Five**

**Number and Operations**

Content Standard 1.0 The student will develop number and operation sense needed to represent numbers and number relationships verbally, symbolically, and graphically and to compute fluently and make reasonable estimates in problem solving.

**5.1.1 Understand numbers, ways of representing numbers, relationships among numbers, and number systems.**

Mathematical Thinking at Grade 5

Investigation 1: Sessions 1–6

Investigation 2: Sessions 5

Investigation 3: Session 1, 4–5

Investigation 4: Sessions 5–6

Name That Portion

Investigation 1: Sessions 1–7

Investigation 2: Sessions 1–9

Investigation 3: Sessions 1–8

Investigation 4: Sessions 1–7

Between Never and Always

Investigation 1: Sessions 1–2

Building on Numbers You Know

Investigation 1: Sessions 1–8

Investigation 2: Sessions 1–3, 5–6

Investigation 3: Sessions 4–10

Investigation 4: Sessions 1–2

Investigation 5: Sessions 1–8

Patterns of Change

Investigation 2: Sessions 2–5

Investigation 3: Sessions 2–6

Data: Kids, Cats, and Ads

Investigation 3: Sessions 1–4

Investigation 4: Session 2–3

Investigation 5: Sessions 3–5

**a. read and write numbers from thousandths to millions;**

Mathematical thinking at Grade 5

Investigation 1: Sessions 1–3

Investigation 2: Sessions 5

Name that Portion

Investigation 1: Sessions 1, 2

Investigation 2: Sessions 1–8

Investigation 3: Sessions 1–4, 7–8

Investigation 4: Sessions 1, 5–7

Ten-Minute Math: Seeing Numbers

Between Never and Always

Investigation 1: Sessions 1–2

Building on Numbers You Know

Investigation 2: Session 7

Investigation 4: Sessions 1–2

Data: Kids, Cats, and Ads

Investigation 3: Sessions 1, 4

Investigation 4: Session 2

**b. name the place value of a given digit from thousandths to millions;**

Mathematical Thinking at Grade 5

Investigation 2: Session 2–4

Investigation 3: Sessions 1, 5

Investigation 4: Sessions 5–6

Name that Portion

Investigation 3: Session 2–4, 7

**c. use various models to show relationships among whole numbers, fractions, mixed numbers, and decimals (e.g., number lines, base ten blocks, Venn diagrams, hundreds boards);**

Mathematical Thinking at Grade 5

Investigation 1: Session 1–3

Name That Portion

Investigation 1: Sessions 2–7

Investigation 2: Sessions 1–6

Investigation 3: Session 2, 8

**d. communicate using mathematical language and symbols;***These are some of the many investigations that require students to communicate using mathematical language and symbols.*

Mathematical Thinking at Grade 5

Investigation 1: Sessions 1–2, 4–6

Investigation 3: Session 4

Investigation 4: Sessions 5–6

Name That Portion

Investigation 4: Sessions 1–7

Building on Numbers You Know

Investigation 1: Sessions 1–8

Investigation 2: Sessions 1–3, 5–6

Investigation 3: Sessions 4–10

Investigation 4: Sessions 1–2

Investigation 5: Sessions 1–8

Patterns of Change

Investigation 2: Sessions 2–5

Investigation 3: Sessions 2–6

**e. model proper fractions, improper fractions, and mixed numbers;**

Name That Portion

Investigation 1: Sessions 3–4, 7

Investigation 2: Sessions 1–6

Investigation 3: Session 8

**f. show the relationship between improper fractions and mixed numbers;**

Name That Portion

Investigation 2: Sessions 6–8

Investigation 3: Sessions 7–8

**g. recognize and generate equivalent forms of commonly used fractions, decimals, and percents (e.g.,  $\frac{1}{10}$ ,  $\frac{1}{4}$ ,  $\frac{1}{2}$ ,  $\frac{3}{4}$ );**

Between Never and Always

Investigation 1: Sessions 1–2

Name That Portion

Investigation 1: Sessions 1–7

Investigation 2: Sessions 1–9

Investigation 3: Sessions 1, 3–8

Investigation 4: Sessions 1–7

Data: Kids, Cats, and Ads

Investigation 3: Sessions 1–4

Investigation 4: Session 3

Investigation 5: Sessions 3–5

**h. recognize relationships among commonly used fractions and decimals.**

Name That Portion

Investigation 3: Sessions 1, 5–6, 8

Between Never and Always

Investigation 1: Sessions 1–2

**5.1.2 Understand meanings of operations and how they relate to one another.**

Mathematical Thinking at Grade 5

Investigation 2: Sessions 1–4

Investigation 3: Sessions 2–5

Investigation 4: Sessions 1, 5–6

Building on Numbers You Know

Investigation 1: Sessions 1, 3–4, 6–8

Investigation 2: Sessions 1–2, 5–6

Investigation 3: Sessions 1–3

Investigation 4: Session 2

Investigation 5: Sessions 4–6

Measurement Benchmarks

Ten-Minute Math: Estimation and Number Sense

**a. use commutative, associative, and identity properties;**

Mathematical Thinking at Grade 5

Investigation 2: Sessions 1–4

Investigation 3: Sessions 2–5

Building on Numbers You Know

Investigation 1: Sessions 3–4, 6–7

Investigation 2: Sessions 5–6

Investigation 3: Sessions 1–3

Measurement Benchmarks

Ten-Minute Math: Estimation and Number Sense

**b. explain and demonstrate the inverse nature of addition and subtraction;**

Building on Numbers You Know

Investigation 5: Sessions 4–6

**c. explain and demonstrate the inverse nature of multiplication and division;**

Building on Numbers You Know

Investigation 2: Sessions 5–6

Investigation 5: Sessions 4–6

**d. communicate the effects of addition, subtraction, multiplication, and division on size and order of numbers.**

Mathematical Thinking at Grade 5

Investigation 4: Sessions 1, 5–6

Building on Numbers You Know

Investigation 1: Sessions 1, 8

Investigation 2: Sessions 1–2

Investigation 3: Sessions 1–3

Investigation 4: Session 2

**5.1.3 Solve problems, compute fluently, and make reasonable estimates.**

## Mathematical Thinking at Grade 5

Investigation 2: Sessions 1–5

Investigation 3: Sessions 2–4, 5

Investigation 4: Sessions 2–4, 5–6

## Building on Numbers You Know

Investigation 1: Sessions 1–8

Investigation 2: Sessions 1–2, 3, 4, 5–6

Investigation 3: Sessions 1–10

Investigation 4: Sessions 1–7

Investigation 5: Sessions 1–8

## Name That Portion

Investigation 2: Session 1–9

Investigation 3: Sessions 2, 3–4, 7–8

## Measurement Benchmarks

Investigation 1: Sessions 5–8

Investigation 2: Sessions 7–8

Investigation 3: Session 2

Ten-Minute Math: Estimation and Number Sense

## Patterns of Change

Investigation 3: Session 2

## Containers and Cubes

Investigation 2: Sessions 3–4

## Data: Kids, Cats and Ads

Investigation 5: Sessions 1–5

Ten-Minute Math: The Digits Game

- a. select appropriate methods and tools for computations (e.g., mental computation, estimation, calculators, paper and pencil);**

## Mathematical Thinking at Grade 5

Investigation 2: Session 1

Investigation 3: Sessions 2–4

Investigation 4: Sessions 2–4

## Building on Numbers You Know

Investigation 1: Sessions 1–4, 6–8

Investigation 2: Sessions 1–3

Investigation 3: Sessions 1–10

Investigation 4: Sessions 3–7

## Name That Portion

Investigation 2: Session 3

Investigation 3: Sessions 2–4, 7



**b. explain why one form of a number might be more useful for computation than another form;**

Building on Numbers You Know

Investigation 2: Session 3 (See Teacher Note, page 55.)

Investigation 3: Sessions 1–6

Name That Portion

Investigation 2: Session 6–8

**c. recognize reasonable estimates for operations;**

Mathematical Thinking at Grade 5

Investigation 4: Sessions 5–6

Name That Portion

Investigation 2: Sessions 6–8

Investigation 3: Sessions 2–4, 7

Building on Numbers You Know

Investigation 1: Sessions 6–8

Investigation 3: Sessions 1–3

Investigation 5: Sessions 1–2

**d. add, subtract, multiply, and divide whole numbers and decimals;**

Mathematical Thinking at Grade 5

Investigation 2: Sessions 2–5

Investigation 3: Sessions 2–4, 5

Investigation 4: Sessions 5–6

Building on Numbers You Know

Investigation 1: Sessions 1–8

Investigation 2: Sessions 1–2, 3, 4, 5–6

Investigation 3: Sessions 1–10

Investigation 4: Sessions 1–2

Investigation 5: Sessions 1–8

Name That Portion

Investigation 3: Sessions 2, 3–4, 7

Measurement Benchmarks

Investigation 1: Sessions 5–8

Ten-Minute Math: Estimation and Number Sense

Data: Kids, Cats and Ads

Ten-Minute Math: The Digits Game

**e. use models, benchmarks, and equivalent forms to add and subtract commonly used fractions with like and unlike denominators;**

Name That Portion

Investigation 2: Sessions 1–9

Investigation 3: Sessions 7–8

## Measurement Benchmarks

Investigation 1: Sessions 5–6

Investigation 2: Sessions 7–8

Ten-Minute Math: Estimation and Number Sense

**f. identify missing information and/or too much information in real-world problems;***This investigation can be adapted to provide the opportunity for students to apply this accomplishment.*

Mathematical Thinking at Grade 5

Investigation 4: Sessions 2–4

**g. solve multi-step real-world problems;**

Name that Portion

Investigation 2: Session 9

Investigation 3: Session 7

Building on Numbers You Know

Investigation 2: Session 7

Measurement Benchmark

Investigation 1: Sessions 7–8

Investigation 2: Sessions 1–2, 7–8

Investigation 3: Session 2

Patterns of Change

Investigation 3: Session 2

Containers and Cubes

Investigation 2: Sessions 3–4

Data: Kids, Cats, and Ads

Investigation 5: Sessions 1–5

**h. solve real-world problems using decimals, fractions, and percents.**

Name that Portion

Investigation 1: Session 7

Investigation 2: Session 9

Investigation 3: Session 7

Investigation 4: Sessions 1–7

Measurement Benchmark

Investigation 2: Sessions 1–2

Data: Kids, Cats, and Ads

Investigation 3: Session 1

Investigation 4: Session 1

**Algebra**

**Content Standard 2.0** The student will understand and generalize patterns as they represent and analyze quantitative relationships and change in a variety of contexts and problems using graphs, tables, and equations.

**5.2.1 Represent and analyze patterns, relations, and functions.**

Mathematical Thinking at Grade 5

Investigation 2: Sessions 1, 2–4

Investigation 3: Session 1

Investigation 4: Sessions 5–6

Picturing Polygons

Investigation 1: Sessions 3–4

Investigation 2: Sessions 4–7

Investigation 3: Sessions 1–7

Name That Portion

Investigation 2: Sessions 4–5

Investigation 3: Sessions 5–6

Patterns of Change

Investigation 1: Sessions 1–4

Investigation 2: Session 2

Investigation 3: Session 1

Ten-Minute Math

**a. generalize and extend geometric and numerical patterns;**

Mathematical Thinking at Grade 5

Investigation 2: Sessions 1, 2–4

Investigation 3: Session 1

Investigation 4: Sessions 5–6

Picturing Polygons

Investigation 3: Sessions 1–7

Name That Portion

Investigation 2: Sessions 4–5

Investigation 3: Sessions 5–6

Patterns of Change

Investigation 1: Sessions 1–4

**b. represent and analyze patterns and functions using words, tables, and graphs;**

Mathematical Thinking at Grade 5

Investigation 2: Sessions 1, 2–4

Investigation 3: Session 1

Investigation 4: Sessions 5–6

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

**c. apply basic function rules.**

Picturing Polygons  
Investigation 1: Sessions 3–4  
Investigation 2: Sessions 4–7  
Investigation 3: Sessions 1–2, 4–7  
Patterns of Change  
Investigation 2: Session 2  
Investigation 3: Session 1  
Ten-Minute Math

**5.2.2 Represent and analyze mathematical situations and structures using algebraic symbols.**

Mathematical Thinking at Grade 5  
Investigation 4: Sessions 2–4  
Name That Portion  
Investigation 1: Sessions 3–4  
Investigation 2: Sessions 3, 6  
Ten-Minute Math  
Building on Numbers You Know  
Investigation 1: Sessions 1–8  
Investigation 2: Sessions 1–3, 5–6  
Investigation 3: Sessions 4–10  
Investigation 4: Sessions 1–2  
Investigation 5: Sessions 1–8  
Patterns of Change  
Investigation 1: Sessions 3–4 (See Teacher Note pages.)

**a. demonstrate understanding that an equation is a number sentence stating two quantities are equal;**

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

## Building on Numbers You Know

Investigation 1: Sessions 1–8

Investigation 2: Sessions 1–3, 5–6

Investigation 3: Sessions 4–10

Investigation 4: Sessions 1–2

Investigation 5: Sessions 1–8

**b. solve open sentences using informal methods and knowledge of operations;**

Mathematical Thinking at Grade 5

Investigation 4: Sessions 2–4

**c. represent the idea of a variable as an unknown quantity using a letter or a symbol;**

Building on Numbers You Know

Investigation 1: Sessions 3–4

Patterns of Change

Investigation 1: Sessions 3–4 (See Teacher Note pages.)

**d. express mathematical relationships using equations.**

Name That Portion

Investigation 1: Sessions 3–4

Investigation 2: Sessions 3, 6

Ten-Minute Math

Building on Numbers You Know

Investigation 1: Sessions 1–8

Investigation 2: Sessions 1–3, 5–6

Investigation 3: Sessions 4–10

Investigation 4: Sessions 1–2

Investigation 5: Sessions 1–8

**5.2.3 Illustrate general properties of operations.**

Mathematical Thinking at Grade 5

Investigation 2: Sessions 1–4

Investigation 3: Sessions 2–5

Building on Numbers You Know

Investigation 1: Sessions 3–4, 6–7 (See Teacher Note pages.)

Investigation 2: Sessions 5–6

Investigation 3: Sessions 1–3

Measurement Benchmarks

Ten-Minute Math: Estimation and Number Sense

**a. apply commutative, associative, zero, distributive, and identity properties;**

Mathematical Thinking at Grade 5

Investigation 2: Sessions 1–4

Investigation 3: Sessions 2–5

Building on Numbers You Know

Investigation 1: Sessions 3–4, 6–7 (See Teacher Note pages.)

Investigation 2: Sessions 5–6

Investigation 3: Sessions 1–3

Measurement Benchmarks

Ten-Minute Math: Estimation and Number Sense

**b. show that division is not commutative.***This investigation provides the opportunity to show that division is not commutative.*

Building on Numbers You Know

Investigation 2: Sessions 5–6

**5.2.4 Analyze change in various contexts.**

Patterns of Change

Investigation 1: Sessions 1–4

Investigation 2: Sessions 1–5

Investigation 3: Sessions 1–7

**a. investigate how a change in one variable relates to a change in a second variable;**

Patterns of Change

Investigation 2: Session 2

Investigation 3: Session 1

**b. use a variety of methods to compare and describe situations involving constant and/or varying rates of change.**

Patterns of Change

Investigation 1: Sessions 1–4

Investigation 2: Sessions 1–5

Investigation 3: Sessions 1–7

**Geometry****Content Standard 3.0**

The student will develop an understanding of geometric concepts and relationships as the basis for geometric modeling and reasoning to solve problems involving one-, two-, and three-dimensional figures.

**5.3.1 Analyze characteristics and properties of two- and three-dimensional shapes.**

Measurement Benchmarks

Ten-Minute Math: Quick Images

Picturing Polygons

Investigation 1: Sessions 1–4

Investigation 2: Sessions 1–8

Investigation 3: Sessions 1–7

Containers and Cubes

Investigation 4: Sessions 1–9

Name That Portion

Investigation 1: Session 7, page 31

Investigation 2: Sessions 1–2

Investigation 3: Session 8

Investigation 4: Sessions 2–7

**a. identify, compare, and analyze attributes of two- and three-dimensional figures;**

Measurement Benchmarks

Ten-Minute Math: Quick Images

Picturing Polygons

Investigation 1: Session 2

Investigation 2: Sessions 1–5

Investigation 3: Sessions 1–2

Containers and Cubes

Investigation 4: Sessions 1–9

**b. use the attributes of geometric figures to develop definitions;**

Picturing Polygons

Investigation 1: Sessions 1, 2–4

Investigation 2: Session 1

Investigation 3: Sessions 1–3

**c. draw points, lines, line segments, rays, and angles;**

Picturing Polygons

Investigation 1: Session 3

Investigation 2: Sessions 4–5

**d. identify and describe the attributes of a circle using appropriate mathematical language (e.g., radius, diameter, center);**

Name That Portion

Investigation 1: Session 7, page 31

Investigation 2: Sessions 1–2

Investigation 3: Session 8

Investigation 4: Sessions 2–7

**e. use properties to classify geometric figures;**

Picturing Polygons

Investigation 1: Sessions 1, 2, 3, 4

Investigation 3: Sessions 1–2, 3, 4, 5–6

Containers and Cubes

Investigation 1: Sessions 1–9

**f. investigate and describe the results of subdividing and combining geometric figures;**

Picturing Polygons

Investigation 1: Session 2

Investigation 2: Session 8

Investigation 3: Session 4–6

**g. compare and contrast congruent and symmetrical geometric figures;**

Picturing Polygons

Investigation 3: Sessions 1–2, 4–7

**h. describe characteristics of lines and angles (e.g., parallel, perpendicular, intersecting, right, acute, obtuse);**

Picturing Polygons

Investigation 2: Sessions 1–7

**i. make and test hypothesis about geometric properties;**

Picturing Polygons

Investigation 2: Sessions 1–3

Investigation 3: Sessions 1–6

Containers and Cubes

Investigation 4: Sessions 4–6

**j. explore similarity.**

Picturing Polygons

Investigation 2 Sessions 4–5, 6–7

Investigation 3: Sessions 5–6



**5.3.2 Specify locations and describe spatial relationships using coordinate geometry and other representational systems.**

## Picturing Polygons

Investigation 1: Sessions 3–4

Investigation 2: Sessions 4–7, 9

Investigation 3: Sessions 1–2, 5–6

## Patterns of Change

Investigation 2: Session 2 (Follow-Up), 3, 4, 5

Investigation 3: Sessions 1, 2, 3, 5–6

**a. describe location and movement using appropriate mathematical language;**

## Picturing Polygons

Investigation 1: Sessions 3–4

Investigation 2: Sessions 4–7, 9

Investigation 3: Sessions 1–2, 5–6

**b. find and specify points in Quadrant I of a coordinate system.**

## Picturing Polygons

Investigation 1: Sessions 3–4

Investigation 2: Sessions 4–7, 9

Investigation 3: Sessions 1–2, 5–6

## Patterns of Change

Investigation 2: Session 2 (Follow-Up), 3, 4, 5

Investigation 3: Sessions 1, 2, 3, 5–6

**5.3.3 Apply transformations and use symmetry to analyze mathematical situations.**

## Picturing Polygons

Investigation 2: Sessions 6–7, 9

Investigation 3: Sessions 1–6

**a. investigate, predict, and describe the results of transformations of two-dimensional figures (i.e., slides, flips, turns);**

## Picturing Polygons

Investigation 2: Sessions 6–7, 9

Investigation 3: Sessions 1–3, 5–6

**b. describe line and rotational symmetry in two-dimensional figures;**

*In this Investigation students have the opportunity to describe line and rotation symmetry in two-dimensional shapes.*

Picturing Polygons

Investigation 2: Sessions 1–9

See also, *Grade 4: Sunken Ships and Grid Patterns*

Investigation 2: Sessions 2–3, 6–9

**c. describe a motion or a series of motions that will show that two shapes are congruent.**

Picturing Polygons

Investigation 3: Session 4

**5.3.4 Use visualization, spatial reasoning, and geometric modeling to solve problems.**

Picturing Polygons

Investigation 2: Sessions 4–5, 6–7

Investigation 3: Sessions 5–6

Containers and Cubes

Investigation 1: Sessions 1–2, 3–4

Investigation 2: Sessions 1–2, 3–4

Investigation 3: Session 3

Investigation 4: Sessions 4–9

**a. construct and draw two- and three-dimensional geometric figures;**

Picturing Polygons

Investigation 2: Sessions 4–5, 6–7

Investigation 3: Sessions 5–6

Containers and Cubes

Investigation 4: Sessions 7–9

**b. create and describe mental images of objects, patterns, and paths;**

Containers and Cubes

Investigation 2: Sessions 1–5

Investigation 3: Session 3

Investigation 4: Sessions 4–6

Patterns of Change

Investigation 1: Sessions 3–4

Picturing Polygons

Investigation 3: Session 4

**c. build a three-dimensional object from a two-dimensional representation (nets) of that object;**

Containers and Cubes

Investigation 1: Sessions 1–2, 3–4

Investigation 2: Sessions 1–2, 3–4

**d. use visualization and spatial reasoning to solve real-world problems.**

Containers and Cubes

Investigation 2: Sessions 1–5

Investigation 3: Session 3

Investigation 4: Sessions 4–6

**Measurement****Content Standard 4.0**

The student will become familiar with the units and processes of measurement in order to use a variety of tools, techniques, and formulas to determine and to estimate measurements in mathematical and real-world problems.

**5.4.1 Understand measurable attributes of objects and the units, systems, and processes of measurement.**

Picturing Polygons

Investigation 2: Session 8

Investigation 3: Sessions 4–6 (Follow-Up)

Measurement Benchmarks

Investigation 1: Sessions 1–8

Investigation 2: Sessions 1–8

Investigation 3: Sessions 1–3

Containers and Cubes

Investigation 1: Sessions 1–2, 3–4

Investigation 2: Sessions 3–4, 5

Investigation 3: Sessions 1–4

Investigation 4: Sessions 1–6

Ten-Minute Math: Volume and Surface Area

**a. demonstrate understanding of the concepts of length, perimeter, circumference, area, weight, capacity, volume, elapsed time, and angle measure;**

Picturing Polygons

Investigation 2: Session 8

Investigation 3: Sessions 4–6 (Follow-Up)

## Measurement Benchmarks

Investigation 2: Sessions 3–8

Investigation 3: Sessions 1–3

## Containers and Cubes

Investigation 1: Sessions 1–2, 3–4

Investigation 2: Sessions 3–4, 5

Investigation 3: Sessions 1–2

Ten-Minute Math: Volume and Surface Area

**b. demonstrate understanding that measurements are approximations;**

## Containers and Cubes

Investigation 3: Sessions 1–4

Investigation 4: Sessions 1–6

## Measurement Benchmarks

Investigation 1: Sessions 1–8

Investigation 2: Sessions 1–5

**c. understand how differences in units affect precision;**

## Measurement Benchmarks

Investigation 1: Sessions 1–4

Investigation 2: Sessions 3–4

**d. demonstrate understanding of the relationships among the units within the same system of measurements;**

## Measurement Benchmarks

Investigation 1: Sessions 4, 5–6

Investigation 2: Sessions 1–8

**e. explore what happens to measurements of a two-dimensional shape when the shape is changed in some way (e.g., perimeter, area).**

## Picturing Polygons

Investigation 3: Sessions 4–6

**5.4.2 Apply appropriate techniques, tools, and formulas to determine measurements.**

## Measurement Benchmarks

Investigation 1: Sessions 1, 3, 4, 5–8

Investigation 2: Sessions 1–4, 7–8

Investigation 3: Sessions 1–3

## Containers and Cubes

Investigation 1: Sessions 1–2, 3–4

Investigation 2: Sessions 1–2, 3–4, 5

Investigation 3: Sessions 1–2, 3, 4

Investigation 4: Sessions 1, 2–3, 4–5, 7–9

Ten-Minute Math: Volume and Surface Area

**a. apply and explain appropriate estimation strategies using standard units of measure;**

## Measurement Benchmarks

Investigation 1: Sessions 5–6, 7–8

Investigation 2: Session 3

**b. select and apply appropriate standard units to measure length, perimeter, area, capacity, volume, weight, time, temperature, and angles;**

## Measurement Benchmarks

Investigation 1: Sessions 1, 3, 4, 5–6, 7

Investigation 2: Sessions 3, 4

Investigation 3: Session 1

**c. select and use appropriate tools for measuring in real-world situations;**

## Measurement Benchmarks

Investigation 1: Sessions 1, 3, 4, 5–6, 7

Investigation 2: Sessions 3, 4

Investigation 3: Session 1

**d. solve real-world problems involving measurement and elapsed time;**

## Measurement Benchmarks

Investigation 1: Sessions 5–8

Investigation 2: Sessions 1–2, 7–8

Investigation 3: Sessions 2–3

**e. read and record temperature using Fahrenheit and Celsius scales;***Related content:*

## Measurement Benchmarks

Investigation 1: Session 1

Investigation 2: Sessions 1–2, 4

**f. develop, understand, and use formulas to find the area of parallelograms and triangles;***Related content:*

## Containers and Cubes

Investigation 1: Sessions 1–2

**g. explain and demonstrate how scale in maps and drawings shows relative size and distance;**

Measurement Benchmarks

Investigation 1: Sessions 7–8

**h. develop informal strategies to determine the surface area and volume of rectangular solids.**

Measurement Benchmarks

Investigation 2: Session 4

Containers and Cubes

Investigation 1: Sessions 1–2, 3–4

Investigation 2: Sessions 1–2, 3–4, 5

Investigation 3: Sessions 1–2, 3, 4

Investigation 4: Sessions 1, 2–3, 4–5, 7–9

Ten-Minute Math: Volume and Surface Area

**Data Analysis and Probability****Content Standard 5.0**

The student will understand and apply basic statistical and probability concepts as they, organize, and analyze data, and to make predictions and conjectures.

**5.5.1 Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer questions.**

Name That Portion

Investigation 3: Sessions 2, 5–6

Investigation 4: Sessions 1–7

Ten-Minute Math

Between Never and Always

Investigation 2: Session 3

Patterns of Change

Investigation 2: Sessions 2–5

Investigation 3: Sessions 2–6

Data: Kids, Cats, and Ads

Investigation 1: Sessions 1–4

Investigation 2: Session 1

Investigation 3: Sessions 1–3

Investigation 4: Session 1, 3

Investigation 5: Sessions 1–5

**a. collect data using observations, surveys, and experiments;**

Data: Kids, Cats, and Ads

Investigation 1: Session 1

Investigation 2: Sessions 1–3

Investigation 5 : Session 1

**b. understand how data-collection methods affect the nature of the data set;**

Data: Kids, Cats, and Ads

Investigation 1: Session 1

Investigation 2: Session 1

Investigation 3: Sessions 2–3

Investigation 4: Session 2

Investigation 5: Sessions 1–2

**c. represent data using pictographs, bar graphs, tables, circle graphs, and line graphs;**

Patterns of Change

Investigation 2: Sessions 2–5

Investigation 3: Sessions 5–6

Data: Kids, Cats, and Ads

Investigation 2: Sessions 1–2

Investigation 5: Sessions 3–5

**d. interpret data displayed in pictographs, bar graphs, tables, circle graphs, and line graphs.**

Name That Portion

Investigation 3: Sessions 2, 5–6

Investigation 4: Sessions 1–7

Ten-Minute Math

Between Never and Always

Investigation 2: Session 3

Patterns of Change

Investigation 2: Sessions 2–5

Investigation 3: Sessions 2–6

Data: Kids, Cats, and Ads

Investigation 1: Sessions 2–4

Investigation 3: Sessions 2–3

Investigation 4: Session 3

**5.5.2 Select and use appropriate statistical methods to analyze data.**

Data: Kids, Cats, and Ads

Investigation 1: Sessions 1–4

Investigation 2: Sessions 1–3

Investigation 3: Sessions 1–4

Investigation 5: Sessions 3–5

**a. use measures of central tendency (i.e., mean, median, mode);**

Data: Kids, Cats, and Ads

Investigation 1: Sessions 1–4

Investigation 2: Sessions 1–3

Investigation 3: Sessions 1–4

Investigation 5: Sessions 3–5

**b. relate mean, median, and mode to a visual representation of a data set;**

Data: Kids, Cats, and Ads

Investigation 1: Sessions 1–4

Investigation 2: Sessions 1–3

Investigation 3: Sessions 1–4

Investigation 5: Sessions 3–5

**c. find the range of a data set.**

Data: Kids, Cats, and Ads

Investigation 1: Sessions 1 (See Teacher Note, pages 9–13.)

**5.5.3 Develop and evaluate inferences and predictions that are based on data.**

Between Never and Always

Investigation 1: Sessions 3–5

Investigation 2: Session 1–3

Patterns of Change

Investigation 2: Session 1

Data: Kids, Cats, and Ads'

Investigation 1: Session 1

Investigation 2: Session 1, 2

Investigation 3: Sessions 2–4

Investigation 4: Session 2

Investigation 5: Session 1–5

**a. make predictions and justify conclusions based on data;**

Data: Kids, Cats, and Ads

Investigation 2: Sessions 1, 2

Investigation 3: Sessions 2–3, 4

Investigation 5: Session 1–5



**b. design investigations to address a question;**

Between Never and Always

Investigation 1: Sessions 3–5

Investigation 2: Session 3

Patterns of Change

Investigation 2: Session 1

Data: Kids, Cats, and Ads'

Investigation 1: Session 1

Investigation 2: Session 2

**c. examine various representations of data to evaluate how accurately the data is depicted;**

Between Never and Always

Investigation 2: Sessions 1–2

Data: Kids, Cats, and Ads

Investigation 5: Sessions 3–5

**d. explain the importance of sample size in investigations.**

Data: Kids, Cats, and Ads

Investigation 3: Sessions 2–4

Investigation 4: Session 2

Investigation 5: Session 2

**5.5.4 Understand and apply basic concepts of probability.**

Between Never and Always

Investigation 1: Sessions 1–8

Investigation 2: Sessions 1–5

**a. describe the likelihood or chance of events as likely, unlikely, certain, equally likely, or impossible;**

Between Never and Always

Investigation 1: Sessions 1–2, 3–4, 5

Investigation 2: Sessions 1–2

**b. use a sample space to predict the probability of an event;**

Between Never and Always

Investigation 1: Sessions 3–5

Investigation 2: Sessions 1–2

**c. understand that the measure of the likelihood of an event can be represented as a number from 0-1.**

Between Never and Always

Investigation 1: Sessions 1–2, 3–4, 5, 6, 7, 8

Investigation 2: Sessions 1–2, 3, 4–5