



# Grade 1 Concept Maps

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# Concept Map for *Mathematical Thinking at Grade 1*

Students are introduced to some of the mathematical materials and processes they will be using this year as they explore counting, comparing, and combining in each of the three areas of the *Investigations* curriculum: number, data, and space

**INVESTIGATION 1: *Exploring Materials*** – Students explore mathematical materials and tools; compare and find relationships among geometric shapes; count up to 20 objects

**Session 1: Getting Started with Materials**  
The class establishes routines for using materials; explores characteristics of the interlocking cubes, pattern blocks, and Geoblocks; uses informal language to describe geometric shapes

**Sessions 2, 3, 4: Exploring Materials**  
Students continue their exploration of mathematical materials; are introduced to the calculator as a mathematical tool; use informal language to describe geometric shapes; count 20 objects

**INVESTIGATION 2: *Exploring Numbers*** – Students develop strategies for comparing two quantities and for combining single-digit numbers; work on representing solutions to problems with pictures, numbers, and words

**Session 1: The Game of Compare**  
Students play *Compare*, a game in which they find the larger of two numbers; combine two quantities; work with partners

**Sessions 2, 3: Intro. Staircases & Choice Time**  
Students learn to build interlocking-cube “staircases”; count, combine, compare, and order sets and numbers, use numbers to show how many

**Session 4: Seven Peas and Carrots**  
Students use manipulatives to solve a problem about combinations of 7; find more than one solution to a problem

**Sessions 5, 6: Number Choices**  
Students continue to count, combine, compare, and order sets and numbers; use numbers to show how many

**INVESTIGATION 3: *Patterns*** – Students become familiar with patterns as they describe and predict sequences, construct patterns, and classify patterns as the same or different, and distinguish between things with and without patterns

**Session 1: What Comes Next?**  
Students play *What Comes Next?*, a game in which they work on describing a pattern and predicting what comes next in a sequence

**Session 2: Clapping Patterns**  
Students represent patterns in more than one way; create patterns with cubes; predict what comes next in a pattern

**Sessions 3, 4: Finding & Making Patterns**  
Students continue to work on comparing, predicting, and creating patterns; find patterns in the world around them

**Sessions 5, 6: What Is a Pattern?**  
Students continue their work on patterns and discuss their ideas about what a pattern is

**INVESTIGATION 4: *Counting and Combining*** – Students count and keep track of a set of objects; use counting, patterns, and other strategies to solve problems; extend understanding of number combinations; make and explain predictions

**Session 1: Collect 15 Together**  
Students play *Collect 15 Together*; count a group of objects; keep track of a growing collection of objects

**Sessions 2, 3: Counting & Combining**  
Students continue their work with counting, combining & comparing two numbers; predicting what comes next

**Session 4: Eleven Fruits (Assessment)**  
Students solve “How Many of Each?” problems; focus on sharing solutions and strategies in a class discussion

**Session 5: Making Predictions About a Story**  
Students explore numerical patterns; count objects; make & explain predictions

**Session 6: How Many in All?**  
Students continue to use counting, patterns, and other strategies to solve problems

**INVESTIGATION 5: *Data About Our Class*** – Students collect survey data; invent representations that show survey results; count, combine, and compare different groups up to about 30

**Session 1: Kid Pins**  
Students count up to the number of students in the class; match sets of the same size

**Session 2: Attendance and Other Surveys**  
Students work with class surveys to combine the number of students into different categories; represent data that fall in two categories

**Sessions 3, 4: Inventing Survey Representations**  
Students continue their work with surveys, inventing and constructing representations of data; explaining, interpreting, and presenting their results to others

**Sessions 5, 6: How We Got to School Today**  
Students continue their work with surveys; determine how to categorize data; make sense of data involving more than two categories

## Concept Map for *Building Number Sense*

Students discover ways that numbers can be made from other numbers; develop strategies for solving addition and subtraction story problems; read, write, and sequence numbers to 100

**INVESTIGATION 1: *Visualizing Numbers*** – Students develop strategies for organizing, counting, and comparing collections of objects

**Session 1: Quick Images**  
Students share ways to think about various dot-pattern images in order to remember them

**Session 2: Compare Dots**  
Students play *Compare Dots*, a game in which they compare the numbers of dots on dot-pattern cards

**Sessions 3, 4: Copying Cubes**  
Students build, trade, and copy three-dimensional objects and develop strategies for counting, comparing & arranging sets of objects

**Sessions 5, 6: Number Shapes**  
Students use pattern blocks to create designs; count how many blocks used in all; count how many of each kind

**Sessions 7, 8: Making Dot Pictures**  
Students find ways to organize sets of dots so that they are easy to count; record how many

**Session 9: How Many Dots?**  
Students create their own dot-pattern images; explore ways to describe different arrangements of objects

**INVESTIGATION 2: *Building Numbers in Different Ways*** – Students find combinations of numbers; compare different quantities; use pictures, stories, and objects to model number combinations

**Session 1: Twelve Cats and Dogs**  
In “How Many of Each?” problems, students find combinations of 12 and share their solutions

**Session 2: Problems About Ten**  
Students create, solve, and share their own “How Many of Each?” problems

**Session 3: The Game of Double Compare**  
Students play *Double Compare*, a game in which they find which of two totals is larger

**Sessions 4, 5: Breaking Numbers into Two Parts**  
Students explore the relationships among number combinations in two games, *On and Off* and *Counters in a Cup*

**Sessions 6, 7, 8: Towers of 10 and Number Choices**  
Students explore number combinations and record solutions with pictures, numbers, and words

**Session 9: Three Towers (Assessment)**  
Students think about number combinations and the ways they count and combine sets of objects

**INVESTIGATION 3: *Counting*** – Students work on reading, writing, and sequencing numbers to 100, and on counting quantities up to 40

**Sessions 1, 2: The 100 Chart**  
Students explore the 100 chart; play *Missing Numbers*; explore number sequencing

**Sessions 3, 4: Which Holds More?**  
Students estimate more and less volume; find the larger of two quantities; explore use of the calculator as a mathematical tool

**Sessions 5, 6, 7: More Counting and Comparing**  
Students play *Ten Turns* to practice the oral counting sequence and written numeration; count and compare quantities; read, write, and sequence numbers to 100; explore patterns in the number sequence

**Session 8: Clapping Patterns**  
Students make and describe repeating patterns; represent the same pattern in different ways (through physical actions, objects, drawings, numbers)

**Session 9: Counting Stories (Excursion)**  
Students estimate quantities; count quantities up to 100; sequence numbers up to 100; locate numbers on the 100 chart

**INVESTIGATION 4: *Addition and Subtraction*** – Students visualize combining and separating problem situations; develop strategies for solving such problems; record problem-solving strategies

**Session 1: Introducing Combining Situations**  
Students visualize combining situations; solve combining story problems

**Session 2: Introducing Separating Situations**  
Students visualize separating situations; solve separating story problems

**Sessions 3, 4, 5: Five-in-a-Row and Story Problems**  
Students play *Five-in-a-Row*, a game in which they practice single-digit addition; develop and record strategies for solving combining/separating story problems

**Session 6: Dot Addition**  
Students play *Dot Addition*, a game in which they make given numbers; find the total of several small, single-digit numbers

**Sessions 7, 8, 9: Combining and Separating**  
Students become familiar with single-digit addition pairs; develop and record strategies for solving story problems

**Session 10: Solving Story Problems (Assessment)**  
Students solve and record solutions to story problems

## Concept Map for *Survey Questions and Secret Rules*

Students identify and describe attributes of objects (such as color, size, and shape); sort and categorize attribute blocks, buttons, household lids, and even one another as they play a variety of *Guess My Rule* games; create representations of their object sets to demonstrate the “secret” rules used for sorting; collect data, which they sort and represent in various ways

**INVESTIGATION 1: *Sorting*** – Students identify and describe attributes of various materials; use attributes as a basis for sorting and categorizing objects; develop strategies for sorting; create representations of sorted objects

<p style="text-align: center;"><b>Sessions 1, 2: Sorting Shapes</b></p> <p>Students explore and describe attribute blocks; sort shapes based on rules; create representations and rules for a set of sorted blocks</p>	<p style="text-align: center;"><b>Session 3: Sorting</b></p> <p>Students play <i>Guess My Rule</i>, a game in which they use language to describe how groupings were made; continue sorting and categorizing objects</p>	<p style="text-align: center;"><b>Session 4: Sorting Buttons</b></p> <p>Students continue work on sorting, this time with buttons; explore and describe attributes of object collections</p>	<p style="text-align: center;"><b>Session 5: Sorting Lids</b></p> <p>Students continue sorting; describing attributes; identifying like features of objects; categorizing data so that others can guess the sorting rule</p>	<p style="text-align: center;"><b>Session 6: Representations of Sorted Objects (Assessment)</b></p> <p>Students sort buttons/lids and create representations for their sorted sets</p>
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**INVESTIGATION 2: *Survey Questions*** – Students make plans for gathering and recording data; sort and categorize data; construct representations of collected data; explain, interpret, and present their survey results to others

<p style="text-align: center;"><b>Sessions 1, 2 : Would You Rather?</b></p> <p>Students respond to a survey question, collect data from the class, and figure out ways to represent the collected data. Focus is on inventing representations of data, explaining and interpreting results</p>	<p style="text-align: center;"><b>Sessions 3, 4: More Surveys and Sorting</b></p> <p>Using the Choice Time format, students continue their work on sorting; recognizing sorting criteria; collecting and keeping track of data</p>	<p style="text-align: center;"><b>Sessions 5, 6: Representing and Sharing Survey Results</b></p> <p>Students continue to invent representations of data collected; communicate their findings and explain and interpret their results</p>
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**INVESTIGATION 3: *Birthdays*** – Students become familiar with the calendar; group, describe, and order data about birthdays; observe the sequence of months

<p style="text-align: center;"><b>Session 1: When Is Your Birthday?</b></p> <p>Students work with their birthday dates; compare sizes of groups; describe collected data</p>	<p style="text-align: center;"><b>Session 2: Whose Birthday Comes Next?</b></p> <p>Students work with different ways of organizing class birthday data; sequence and interpret collected data; observe cyclical nature of the months</p>	<p style="text-align: center;"><b>Session 3: Timeline (Excursion)</b></p> <p>Students listen to the story <i>A House for a Hermit</i> (by Eric Carle); create a group timeline to tell a similar story; focus on sequencing data and creating a timeline representation</p>
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**INVESTIGATION 4: *Ages and Attendance*** – Students create a variety of representations for several categories of data; describe data qualitatively and quantitatively; compare sets of data; interpret data that show values

<p style="text-align: center;"><b>Session 1: How Old Are We?</b></p> <p>Students use their ages for data collection and use a variety of methods to represent, describe, and compare the data</p>	<p style="text-align: center;"><b>Sessions 2, 3: Representing Data on Family Ages</b></p> <p>Students continue their work on categorizing data and representing the information in different forms</p>	<p style="text-align: center;"><b>Sessions 4, 5: Attendance Comparisons (Assessment included)</b></p> <p>Students describe data qualitatively and quantitatively; compare two sets of data; create their own representation for an “unusual” day</p>
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## Concept Map for *Quilt Squares and Block Towns*

Students observe, describe, compare, classify, represent, and build with two-dimensional and three-dimensional shapes. Using pattern blocks, Geoblocks, and the *Shapes* computer software, students put together shapes to make patterns and designs. They learn about the characteristics of 2-D shapes, 3-D shapes, and the relationships among those shapes. Students develop vocabulary for naming and describing two- and three-dimensional shapes

**INVESTIGATION 1: 2-D Shapes and Patterns** – Students observe and compare 2-D shapes and develop the vocabulary to describe them; become familiar with shape names; compose and decompose shapes; notice relationships between certain shapes and use rotation and reflection to arrange shapes. Counting, adding, and pattern work continue to be developed

**Session 1: What Shapes Do You See?**

Students are introduced to the concept of shape; use informal language to describe shapes; become familiar with shape names

**Session 2: Same Shape, Different Pieces**

Students fill an outline with shapes; find combinations of shapes that fill a region; count and add

**Sessions 3, 4, 5, 6:  
Describing 2-D Shapes**

Students build, trade, and copy three-dimensional objects and develop strategies for counting, comparing, and arranging sets of objects

**Session 7: Three Ways to Fill an Outline**

Students use pattern blocks to create designs and then count the different blocks they used

**Sessions 8, 9, 10: Filling Shapes**

Students work on composing and decomposing shapes; altering designs to cover the same space; naming and describing shapes

**Sessions 11, 12: Sorting 2-D Shapes**

Students describe, compare, sort, and classify 2-D shapes; describe characteristics of triangles

**Sessions 13, 14, 15: Quilts with Squares and Rectangles**

Students design quilt squares; see relationships between squares and triangles; use repeated units to create a pattern

**INVESTIGATION 2: Comparing and Constructing 3-D Shapes** – Students observe and compare 3-D shapes as they develop the vocabulary necessary to describe them; construct 3-D shapes from 2-D faces; create and use 2-D representations of 3-D shapes

**Sessions 1, 2: Describing and Comparing Shapes**

Students construct and describe 3-D objects; compare sizes, shapes, and orientations of objects; look at 3-D objects as wholes and as having parts

**Session 3: Block Pictures**

Students describe and compare characteristics of 3-D shapes; match 3-D objects to 2-D pictures of the objects

**Sessions 4, 5, 6: Blocks in a Sock**

Students play *Blocks in a Sock*, a game in which they identify shapes by touch; describe and compare sizes and shapes; explore squares, rectangles, and triangles

**Session 7:  
What Kind of Box Is It?**

Students relate size and shape to function; describe rectangular prisms; make 3-D objects from 2-D pieces

**Sessions 8, 9, 10: Making Boxes**

Students construct boxes and compare sizes and shapes; visualize and describe rectangular prisms; recognize which faces of rectangular prisms are the same size and shape

**INVESTIGATION 3: Building a Block Town** – Students continue working with 2-D and 3-D shapes; build 3-D constructions from 2-D representations; visualize, describe, and compare paths between two locations and describe directions of various turns

**Sessions 1, 2: Drawing Geoblocks**

Students observe and describe characteristics of 3-D shapes; make a 2-D representation of a 3-D object; build 3-D constructions from 2-D representations

**Sessions 3, 4: Planning a Town**

Students use their developing understanding of shapes to plan their own town made with geometric structures, with limited space and materials; make a 2-D representation of a 3-D structure

**Session 5: Building a Town**

Students work to build their town, making 3-D constructions from a 2-D plan; describe the shapes of their buildings

**Sessions 6, 7: Giving Directions**

Students give directions to navigate their town; visualize paths between two locations; estimate distances; follow and give directions for how to move in space; record written directions

## Concept Map for *Number Games and Story Problems*

Students deepen their understanding of number and number relationships through counting; find combinations for different totals; read, write, and sequence numbers up to 100; recognize and interpret addition and subtraction situations while developing strategies for solving addition and subtraction story problems

**INVESTIGATION 1: *Number Combinations*** – Students work on number combinations up to 20 with two or more single-digit numbers; explore relationships among different combinations of a number

<p><b>Session 1: Pictures of Ten</b> Students play “Quick Images”; are introduced to using equations to describe groups or rows of dots in each dot-pattern image</p>	<p><b>Sessions 2, 3: Number Combinations</b> Students play <i>Dot Addition</i> and <i>On and Off</i> to practice addition skills and strategies</p>	<p><b>Sessions 4, 5: Total of 10</b> Students play <i>Total of 10</i>, a game in which they practice their addition skills and strategies, and record results using addition notation</p>	<p><b>Session 6: How Many of Each Color?</b> Students find combinations of 10 using three addends; search for more than one solution to a “How Many of Each?” problem</p>	<p><b>Sessions 7, 8, 9: Crayon Puzzles</b> Students work with number puzzles to develop reasoning strategies about greater, lesser, and equal amounts</p>	<p><b>Session 10: Number Combination Stories (Excursion)</b> Students create their own number combination stories</p>
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**INVESTIGATION 2: *Twos, Fives, and Tens*** – Students find totals of several 2’s, 4’s, 5’s, 10’s; develop strategies for organizing sets of objects; become familiar with coins and the equivalencies among them; work with different models for grouping 2’s, 4’s, 5’s, 10’s

<p><b>Session 1: How Many Hands?</b> Students develop meaning for counting by 2’s; find and record strategies for totals of several 2’s</p>	<p><b>Session 2: Twos and Fours</b> Students explore patterns in even numbers while continuing to work on counting by 2’s and 4’s</p>	<p><b>Session 3: Collect 25¢ Together</b> Students play <i>Collect 25¢ Together</i>, a game in which they become familiar with coins and the equivalencies among them</p>	<p><b>Sessions 4, 5: Counting and Combining</b> Students continue to develop strategies for organizing sets of objects so that they are easy to count and combine</p>	<p><b>Sessions 6, 7, 8: Numbers to 100</b> Students play <i>Missing Numbers</i> and continue work on number sequence, number patterns, and object-organization strategies</p>
<p><b>Session 9: Patterns of Fives and Tens</b> Students make and describe repeating patterns; represent the same pattern in different ways</p>	<p><b>Sessions 10, 11, 12: Twos, Fives, and Tens</b> Students play <i>Roll Tens</i> to practice counting and combining strategies for 30, 50, and 100; use the calculator as a mathematical tool; participate in an assessment activity that reveals how they organize sets to make them easy to count and what strategies they have for finding the total of several 1’s, 2’s, and 5’s</p>			<p><b>Session 13: Counting by Kangaroos (Excursion)</b> Students find and record strategies for counting and combining the total of three groups of 11, 12, or 13</p>

**INVESTIGATION 3: *Addition and Subtraction*** – Students visualize combining and separating problem situations; develop strategies for solving story problems and recording their solutions; develop familiarity with single-digit addition pairs

<p><b>Session 1: Combining Situations</b> Students extend their understanding of combining problems and record their solutions and strategies</p>	<p><b>Session 2: Separating Situations</b> Students extend their understanding of separating problems and record their solutions and strategies</p>	<p><b>Sessions 3, 4, 5: Five-in-a-Row and Story Problems</b> Students play a more challenging version of <i>Five-in-a-Row</i> to provide practice with single-digit addition pairs with sums up to 20</p>	<p><b>Sessions 6, 7, 8: Tens Go Fish</b> Students make combinations of 10 with two addends and develop reasoning strategies about those combinations</p>
<p><b>Session 9: Combining with Unknown Change</b> Students work with a total and one given amount and must find the missing amount; create story problems to match addition expressions</p>	<p><b>Sessions 10, 11, 12: Addition and Subtraction</b> Students develop and record strategies for solving a variety of combining and separating story problems with numbers up to 20</p>		<p><b>Session 13: Solving Story Problems (Assessment)</b> Students solve a variety of combining and separating story problems and record their solutions</p>

## Concept Map for *Bigger, Taller, Heavier, Smaller*

Students become familiar with the process of measuring by comparing weights, filling containers, and calculating the lengths of objects; develop the oral language needed to describe weight, capacity, and length; explore quantitative comparisons and learn to use units when measuring and comparing

**INVESTIGATION 1: *Weighing and Balancing*** – Students develop a sense of what is heavier or lighter by feel; develop the language to describe and compare weights; learn to use a balance; represent the results of weight comparisons

**Sessions 1, 2: Exploring Weight**

Students begin their exploration of weight through hefting objects for comparison; use a pan balance to compare weights; develop language used to describe weight

**Sessions 3, 4: Comparing Two Objects**

Students continue their work from the previous sessions; find objects that have comparative weights; begin to represent the results of their weight comparisons

**Sessions 5, 6:  
Balancing Groups of Objects**

Students use their developing sense of weight to balance groups of objects evenly; develop the language needed to discuss weighing and balancing

**INVESTIGATION 2: *Filling*** – Students develop the language necessary to describe and compare capacity; measure and compare capacities using nonstandard units; collect and keep track of data

**Session 1: A Cupful of Sand**

Students experiment with spoonfuls of sand; experiment and describe techniques for filling containers; collect and interpret data; count and keep track of data gathered

**Sessions 2, 3, 4: Filling Space**

Students develop and describe techniques for comparing the capacities of different containers; explain why one container holds more than another; fill areas with shapes; notice relationships among certain shapes; describe capacity in less than whole units

**Sessions 5, 6, 7: Comparing Containers**

Students continue to explore techniques for filling containers; use a unit to measure capacity; relate size and shape to capacity; compare capacities of more than two containers; count quantities to 50

**INVESTIGATION 3: *Measuring Length*** – Students develop the language necessary to describe and compare lengths; compare and order lengths directly; measure and compare lengths using nonstandard units; represent lengths with numbers, objects, and pictures

**Session 1:  
Longer Than, Shorter Than**

Students explore what length is and then compare lengths directly

**Session 2:  
Measuring with Hands and Feet**

Students describe ways of measuring length; use direct comparison; use a nonstandard unit to quantify measurement; describe lengths that cannot be measured in whole units

**Session 3:  
Feet Lengths**

Students work on ordering (seriating) different lengths; match and compare lengths

**Sessions 4, 5:  
Measuring with Cubes**

Students practice comparing and seriating lengths; repeating a nonstandard unit along the length of an object; represent measurements in a clear way; present information to others