



Grade 2 Concept Maps

- Unit 1: Mathematical Thinking at Grade 2**
- Unit 2: Coins, Coupons, and Combinations**
- Unit 3: Does It Walk, Crawl, or Swim?**
- Unit 4: Shapes, Halves, and Symmetry**
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- Unit 8: Timelines and Rhythm Patterns**



Concept Map for *Mathematical Thinking at Grade 2* (Page 1 of 2)

This unit introduces students to some of the content, processes, and materials they will be using to solve problems in mathematics this year as they explore counting and categorization in each of the three areas of the *Investigations* curriculum: number, data, and space (geometry). This unit also introduces students to two of three Classroom Routines (“Today’s Number” and “How Many Pockets?”) that will be used throughout the year. This unit is designed to help you establish a mathematical community and environment in your classroom as well as assess your students’ general level of mathematical understanding

INVESTIGATION 1: *Exploring Materials* – Students explore materials they will be using throughout the year; describe and sort materials based on their attributes; count sets of objects; write number expressions to describe configurations of cubes

Session 1: Exploring Cubes and Arrangements of 10

Student explores interlocking cubes; use number sentences to describe various cube configurations; keep track of their daily work

Sessions 2, 3: Exploring Cubes, Pattern Blocks, and Geoblocks

Students explore pattern blocks and Geoblocks; discuss attributes of these two kinds of blocks and of the interlocking cubes

Session 4: Building and Sorting Cube Things

Students count a set of objects; sort objects by similar attributes

INVESTIGATION 2: *Looking at Numbers* – Students keep track of the number of school days; write equations that equal the number of days in school; make combinations of 10; identify uses of numbers in the world

Session 1: How Many Days Have We Been in School?

Students express a number in more than one way; count a group of objects in more than one way; identify where numbers are found and how they are used

Sessions 2, 3: Card Games

Students play *Tens Go Fish* and *Turn Over 10*, games in which they make 10 with two or more addends; compare two quantities and find the difference; count two sets of objects

Sessions 4, 5: Mystery Photos

Students identify places where numbers appear; count and combine groups of objects; record a strategy for combining two numbers

Session 6: Today’s Number and Counting Pockets

Students express a number in more than one way; collect data as they engage in the “How Many Pockets?” Classroom Routine

Session 7: Revealing Mystery Photos

Students identify places where numbers appear; count and combine groups of objects; record strategies

Session 8: Ways to Get to 12

Students write equations to match given situations; express a number using a variety of number sentences

INVESTIGATION 3: *Geometric Counts* – Students explore and describe 2-D geometric shapes; explore, sort, and describe 3-D geometric shapes; find different shapes and arrangements to cover patterns; find and record several solutions to a problem

Sessions 1, 2: Geoblock Faces and Pattern Block Puzzles

Students identify geometric terms for different shapes; cover designs in many ways; identify Geoblocks by their faces; devise ways to record mathematical work

Sessions 3, 4: Counting Geoblocks and Pattern Blocks

Students continue covering designs in many different ways; sort and identify Geoblocks by matching their faces to their outlines

Session 5: Sorting Geoblocks

Students describe attributes of the Geoblocks; sort them by attribute; identify them by feel

Session 6: Pattern Block Counts

Students find the greatest and least numbers of pattern blocks that will cover a given design; find and describe equivalent ways to cover a design

Concept Map for *Mathematical Thinking at Grade 2* (Page 2 of 2)

INVESTIGATION 4: *Counting* – Students count 15–60 objects; count by 2’s, 5’s, 10’s, and in other ways; compare two sets by identifying how many more items are needed for the smaller set to equal the larger, or how many extra items there are in the larger set; add two-digit numbers; identify coins and their values; combine coins to make 25¢ and 50¢

<p style="text-align: center;">Session 1: Enough for the Class?</p> <p>Students count quantities in more than one way; compare two amounts; write about solutions using words and numbers</p>	<p style="text-align: center;">Session 2: Counting Coins, Counting Choices</p> <p>Students count objects; count orally; explore coins and their values</p>	<p style="text-align: center;">Sessions 3, 4: Counting Strips and Counting Choices</p> <p>Students are introduced to counting strips; count orally; write numbers sequentially</p>	<p style="text-align: center;">Session 5: Enough for The Class? Revisited (Assessment)</p> <p>Students work on another “Enough for the Class?” problem; record strategies for solving the problem</p>
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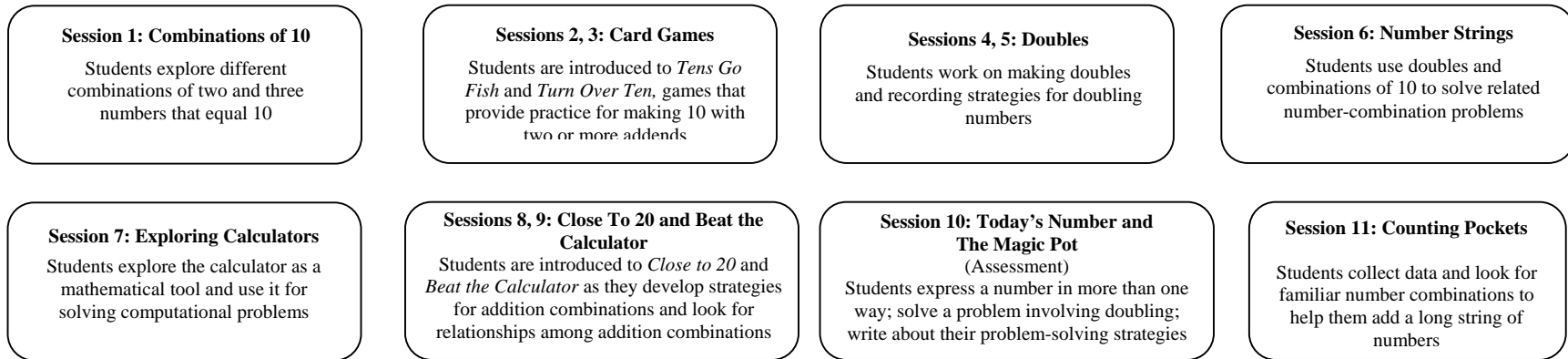
INVESTIGATION 5: *Collecting Data About Ourselves* – Students sort and classify information; collect, record, and represent data; count and compare amounts; count groups of objects in more than one way; talk and write about problem-solving strategies

<p style="text-align: center;">Sessions 1, 2: Collecting and Representing Data About Ourselves</p> <p>Students collect, sort, and classify information; count and compare sets of data; use pictures, tallies, and graphs to organize and display data</p>	<p style="text-align: center;">Session 3: Collecting Pocket Data</p> <p>Students collect, count, and compare more data; combine and compare numbers; express a number in more than one way</p>	<p style="text-align: center;">Sessions 4, 5: Taking Inventories</p> <p>Students count a set of objects; choose categories to classify a set of objects; record and keep track of a data set</p>	<p style="text-align: center;">Session 6: Representing Inventory Data (Assessment)</p> <p>Students make a representation of the inventory data they collected; compare data representations</p>
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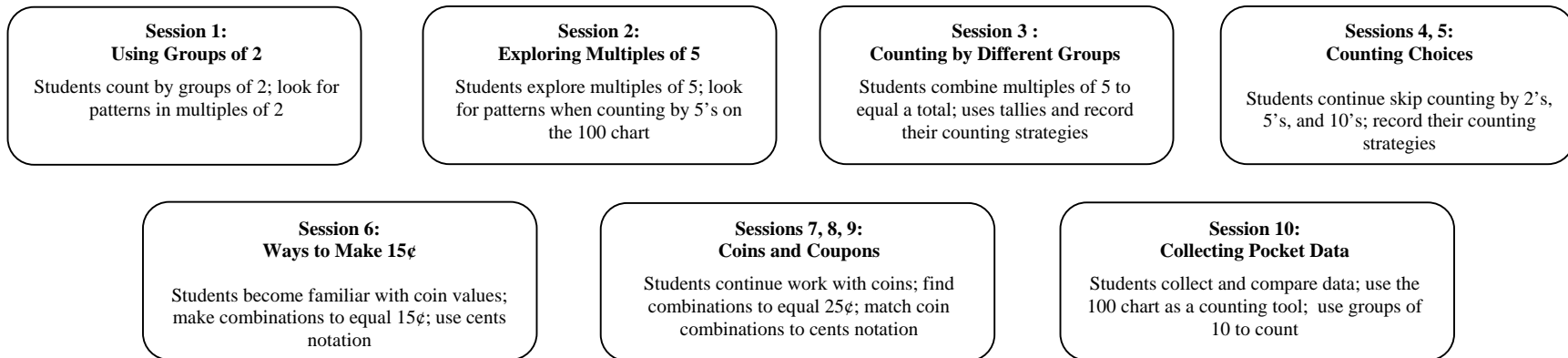
Concept Map for *Coins, Coupons, and Combinations* (Page 1 of 2)

Students develop a sense of numbers as whole quantities and begin to look for patterns and relationships that exist in our number system. They also gain facility with addition combinations, counting strategies, multiples of numbers; and are introduced to combining and separating problems that encourage them to develop problem-solving strategies

INVESTIGATION 1: *10's and Doubles* – Students develop familiarity with 10 as an important number in our number system; work with number combinations of 10 and doubles; develop strategies for adding two or more numbers



INVESTIGATION 2: *Grouping by 2's, 5's, and 10's* – Students explore patterns and develop fluency in skip counting by 2's, 5's, and 10's; explore ways of recording and keeping track when counting large groups; become familiar with coin equivalencies and use money as a model for counting by 5's and 10's



Concept Map for *Coins, Coupons, and Combinations* (Page 2 of 2)

INVESTIGATION 3: *Introducing Addition and Subtraction Situations* – Students develop models of addition and subtraction situations; solve problems using numerical reasoning; use addition and subtraction notation

**Session 1:
Introducing Combining Situations**

Students combine quantities and record problem-solving strategies

**Session 2:
Addition Notation**

Students continue to combine quantities; record strategies; interpret standard notation

**Session 3:
Introducing Separating Situations**

Students separate quantities into two parts and record problem-solving strategies

**Sessions 4, 5:
Making Sense of
Addition and Subtraction**

Students model problem situations and select appropriate problem-solving strategies

INVESTIGATION 4: *One Hundred* – Students become familiar with the structure of 100; work with 100 as a quantity; use the 100 chart as a tool for combining and comparing numbers; use familiar addition combinations to find totals; develop strategies for solving addition and subtraction problems

Session 1: Exploring the 100 Chart

Students construct a 100 chart and become familiar with its structure and patterns

Sessions 2, 3, 4: Working with 100

Students use the 100 chart for comparing numbers and for figuring differences between numbers

Session 5: Penny-a-Pocket

Students collect data; add strings of numbers; communicate their problem-solving strategies in writing

Concept Map for *Does It Walk, Crawl, or Swim?*

Throughout this unit students collect data in a variety of ways and use sorting and classifying as ways to organize those data; focus on similarities and differences in sets of related objects, people, or data; classify groups according to particular attributes

INVESTIGATION 1: *Sorting People and Yekttis* – Students examine the similarities and differences in a group of related objects or data; use negative information to clarify the definition of a category; sort and classify information; collect, record, and represent data; use Venn diagrams to show various relationships within a group of related objects

Sessions 1, 2: Collecting and Representing Data About Ourselves

Students collect, sort, classify, count, and compare sets of data; organize and display their data

Session 3: Working with Two Attributes

Students sort information; consider more than one attribute at a time; explore how to represent data that have shared attributes

Sessions 4, 5: Looking at Yekttis

Students are introduced to Yektti cards; identify attributes of a data set; group data by similar attributes

Session 6: Introducing Venn Diagrams

Students consider two attributes at a time and use a Venn diagram to organize data

INVESTIGATION 2: *Collections: What Goes Together?* – Students think about the characteristics of data; articulate logical reasoning; construct categories for describing data; invent representations of data; use more than one representation to view data

Sessions 1, 2: Exploring Thing Collections

Students sort and group objects according to similar attributes; develop and define categories based on physical attributes; identify a common attribute for a group of objects; use negative information to help identify how objects are sorted

Sessions 3, 4: Sink and Float

Students construct their own categories to describe data they have collected; conduct an experiment as a way of collecting and recording data; invent representations of data; make hypotheses about things that sink and things that float

INVESTIGATION 3: *Animals in the Neighborhood* – Along with Investigation 4, this investigation offers a final project for the unit: Students work on constructing categories to describe data; articulate clear definitions of their categories; organize categorical data

Session 1: How Animals Move

Students construct categories to organize data and then represent those data

Sessions 2, 3: Representing Data in More Than One Way

Students use the data they have collected and devise new ways of representing those data

INVESTIGATION 4: *Scary Things* – Along with Investigation 3, this investigation offers a final project for the unit: Students work on collecting and recording survey data; construct categories to describe those data; compare two data sets; make presentation graphs; report on their data-analysis activities

Session 1: What Scares Us?

Students define categories for data; interview others to collect data; organize data collected

Sessions 2, 3: Comparing Scary Things Data

Students continue to organize additional data they have collected; represent those data; compare two sets of data they have collected

Concept Map for *Shapes, Halves, and Symmetry*

Students explore the structure of shapes and how they can be composed (put together) or decomposed (taken apart) to make other shapes; investigate the structure of rectangular arrays; find halves of two- and three-dimensional shapes; explore symmetry by making symmetrical designs and pictures

INVESTIGATION 1: *Composing and Decomposing Shapes* – Students sort, describe, and identify shapes by various attributes; compose and decompose two- and three-dimensional shapes; describe spatial relationships and numerical relationships found among shapes

<p>Session 1: Shapes Around Us Students identify, describe, and sort two-dimensional shapes found in their environment</p>	<p>Sessions 2, 3: Seeing Shapes Within Shapes Students fit shapes together to cover a region and to form a whole; combine three-dimensional shapes to make a three-dimensional whole</p>	<p>Sessions 4, 5: Shape Puzzles Students identify and describe numerical relationships found among pattern block shapes</p>	<p>Sessions 6, 7, 8: Building Buildings Students play <i>The Last Block</i> and <i>Build a Building</i>; use logical reasoning and spatial relationships; use multiples of a number to describe structure of rectangular prisms</p>
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INVESTIGATION 2: *What Is a Rectangle?* – Students identify triangles and rectangles based on the number of sides and corners; visualize, construct, and draw rectangular arrays; use numbers to compare rectangular arrays

<p>Session 1: Investigating Quadrilaterals Students play <i>Guess My Shape Rule</i>; sort quadrilaterals in different ways; identify rectangles</p>	<p>Session 2: Which Rectangle Is Biggest? Students order rectangles; define “biggest” in different ways; find the number of tiles that cover a given rectangle</p>	<p>Session 3: Building Rectangles Students find and describe different rectangular arrays that have the same number of tiles; represent arrays by drawing on squared paper</p>	<p>Sessions 4, 5: Describing Rectangles Students visualize, reproduce, and construct rectangles by duplicating rows or columns</p>	<p>Session 6: Picturing Rectangles Students evaluate the effectiveness of other students’ written descriptions for building rectangles</p>
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INVESTIGATION 3: *Fractions of Geometric Shapes* – Students work with rectangular arrays and geometric solids to investigate fractional parts; design and construct rectangular regions that are divided into halves, thirds, or fourths

<p>Sessions 1, 2: Halves of Rectangles and Solids Students construct arrays to represent numbers and identify halves; investigate halves of three-dimensional solids</p>	<p>Sessions 3, 4, 5: Cutting Congruent Halves Students work on folding and cutting shapes into congruent halves; construct a shape that can be folded and cut into congruent halves</p>	<p>Session 6: Fraction Flags Students construct rectangular regions that can be divided into halves; copy and enlarge a design</p>	<p>Sessions 7, 8: Fourths and Thirds of Rectangles (Excursion) Students continue constructing and describing arrays that are divided into thirds and fourths</p>
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INVESTIGATION 4: *Symmetry* – Students find and describe objects that have mirror symmetry; make two-dimensional symmetrical designs; build three-dimensional symmetrical structures

<p>Sessions 1, 2: Symmetrical Designs Students identify, describe, and construct objects and patterns that have mirror symmetry</p>	<p>Sessions 3, 4: Reflecting Blocks and Tiles Students continue to work on describing and constructing symmetrical patterns and designs, and building three-dimensional symmetrical structures</p>	<p>Sessions 5, 6: Paper Folding and Cutting Students explore symmetry by folding and cutting paper patterns; make symmetrical patterns; build symmetrical structures</p>	<p>Session 7: Symmetrical Pictures Students plan how symmetrical shapes can be used to make a picture; write about symmetry</p>
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Concept Map for *Putting Together and Taking Apart* (Page 1 of 2)

Students develop strategies for solving addition and subtraction problems based on an understanding of numbers, number relationships, and the operations of addition and subtraction; continue their work on counting with an emphasis on skip counting by 5's and 10's, using cubes, coins, and 100 charts; solve a variety of story problems that involve combining, separating, and comparing two-digit numbers

INVESTIGATION 1: *Combining and Separating* – Students develop models of addition and subtraction situations; solve problems using numerical reasoning; record strategies clearly; consider the relationship between addition and subtraction; understand and use horizontal and vertical notation for addition and subtraction

**Session 1:
Introducing Combining Situations**
Students visualize and develop strategies for understanding and solving combining problems; record strategies clearly

**Session 2:
Introducing Separating Situations**
Students visualize and develop strategies for understanding and solving separating problems; record strategies clearly

**Sessions 3, 4: Making Sense of
Addition and Subtraction**
Students model problem situations, select appropriate strategies for different problem structures; record strategies

**Sessions 5, 6: Writing Stories for
Numerical Problems**
Students write stories to fit numerical situations; use horizontal and vertical notation; match situations to expressions

INVESTIGATION 2: *Working with 100* – Students become familiar with the structure and patterns of the number system from 1 to 100; use coins as a model for adding and subtracting multiples of 5 and 10; use the 100 chart as a tool for combining and comparing numbers; develop strategies for addition and subtraction; compare numbers to 100

**Session 1: Exploring
the 100 Chart**
Students become familiar with the structure and patterns on the 100 chart; add multiples of 5 and 10

**Session 2: Games on
the 100 Chart**
Students use the 100 chart to keep track of a total amount; add multiples of 5 and 10; accumulate 100 objects

**Sessions 3, 4:
Working with 100**
Students share strategies for moving on the 100 chart; calculate distances between two numbers on the 100 chart; solve addition and subtraction problems involving 100

Sessions 5, 6: Collect \$1
Students play *Collect \$1*; use money to add multiples of 5 and 10; calculate the difference between 100 and other numbers; develop strategies for addition and subtraction

**Session 7:
How Many Paper Clips?**
Students solve a story problem about 100 in two different ways; record their strategies; use different strategies to check their solutions

INVESTIGATION 3: *Finding the Missing Part* – Students develop ways to approach different sorts of addition and subtraction situations; recognize and solve problem structures having a variety of givens and unknowns; solve problems using numerical reasoning; create situations for equations; compare solution strategies

Session 1: Parts and Wholes
Students play *Cover-Up* and find one missing part when the total and one part are known; describe and compare strategies

Session 2: Problems with a Missing Part
Students find the missing part in a separating situation; record strategies clearly

**Sessions 3, 4, 5:
Separating and Combining Choices**
Students continue to develop strategies for solving separating and combining problems

Concept Map for *Putting Together and Taking Apart* (Page 2 of 2)

INVESTIGATION 4: *Adding Up to 100* – Students work with 100 and combinations of numbers that equal 100; add strings of numbers by “chunking” or grouping numbers that go together; write a story that reflects an addition equation

Session 1: Emma’s Animals

Students combine numbers to make 100; keep track of amounts to be added; write equations with many addends

Session 2: Ways to Make 100

Students write equations with many addends that equal 100; write stories to go with an equation; group numbers to simplify an equation

**Sessions 3, 4:
Stories About 100**

Students continue writing, illustrating, and solving stories about 100

INVESTIGATION 5: *Addition and Subtraction Strategies* – Students develop strategies for comparing two quantities; calculate the distance between two numbers using the 100 chart; develop ways to approach, recognize, and solve problem structures that have a variety of givens and unknowns; solve problems using numerical reasoning; record and compare solution strategies

Session 1: Introducing Comparing Situations

Students solve problems comparing two quantities and record their strategies

Sessions 2, 3: Capture 5

Students play *Capture 5*; solve problems that involve combining, separating, and comparing numbers; record strategies for solving problems

**Sessions 4, 5:
Strategies for Combining**

Students describe and compare strategies for solving combining problems

Session 6: Capture 5 Strategies

Students reduce an equation with multiple addends to one with only two addends; solve problems that involve combining, separating, and comparing

Session 7: Strategies for Separating

Students describe, record, and compare strategies for solving separating problems

**Session 8: How Far?
(Assessment)**

Students solve problems about calculating the distance between two numbers on the 100 chart and explain their solutions in writing

Concept Map for *How Long? How Far?*

Students explore linear measurement by finding and comparing lengths and using nonstandard units to measure length; develop strategies for iterating and counting units; explore the relationship between size and the number of units needed; construct and measure simple paths; estimate the lengths of paths; investigate turns

INVESTIGATION 1: *Comparing Lengths* – Students use direct and indirect comparison to compare lengths; construct a nonstandard unit to measure length; compare the effects of measurement using units of different sizes; communicate the need for using a standard unit when measuring

Session 1: Scavenger Hunt

Students find ways to compare two lengths; use direct and indirect comparison to identify equal lengths

Sessions 2, 3, 4: A Scavenger Hunt Choice Time

Working with three activities, students use nonstandard units to find items that are a certain number of units long; predict and measure how long those items are when related to a nonstandard unit

Sessions 5, 6, 7: Choices About Measurement

Students focus on iterating units; see how units are related; use units to find the difference between two lengths

Session 8: Measuring Our Classroom (Assessment)

Students use units of their own choosing to measure the width of the classroom; discuss the need for a standard unit

INVESTIGATION 2: *Paths and Geo-Logo* – Students focus on moving along a path; visualize and then represent that path; determine path length by iterating and counting units; compare the lengths of paths by comparing the numbers of units used to measure the paths

Session 1: Walking, Visualizing, and Representing Paths

Students walk paths in their classroom and then describe and record their movements; focus on visualizing and then representing their paths

Sessions 2, 3: Investigating Turns

Students work on understanding turns as changes in orientation or heading; explore what happens when turns are repeated; describe turns in terms of units

Sessions 4, 5: Measuring Paths

Students determine path length by counting and iterating units; compare the lengths of different paths; continue to explore what happens when turns are repeated; describe turns in terms of units

Sessions 6, 7, 8: Moving on a Grid

Students compare lengths of paths represented on grid paper and determine each path's length; focus on interpreting and comparing representations of paths on a grid, and on constructing paths on a grid

Concept Map for *How Many Pockets? How Many Teeth?*

Students are introduced to organizing and representing numerical data so that the information makes sense to them. They explore one another’s data representations along with conventional representations such as line plots and bar graphs

INVESTIGATION 1: *Exploring Numerical Data* – Students collect, keep track of, and organize numerical data; create representations of collected information; describe and interpret representations

Session 1: Quick Data Collections

Students work together to create different types of graphs; represent class data in various ways; develop language to interpret data

Sessions 2, 3: Pocket Towers

Students explore ways to organize numerical data; create representations of data; keep track of data

Sessions 4, 5: Class Surveys

Students continue their work on gathering numerical data; keeping track of them; creating and interpreting representations

INVESTIGATION 2: *Teeth Data* – Students continue to collect, organize, and describe numerical data; focus on features of data (range, unusual pieces of data); represent the same data using different materials; compare, interpret, and hypothesize about data sets

Sessions 1, 2: How Many Teeth Have You Lost?

Students collect data about the teeth they have lost and represent those data in different ways

Session 3 : Comparing Lost Teeth Among Other Grades

Students make predictions about data based on a small sample; plan and organize a data-collection project

Sessions 4, 5: Collecting Teeth Data

Students collect, organize, and represent a set of numerical data; interpret data; make general comparisons of data from two groups

Session 6: Mystery Teeth Data

Students look at important features of a data set; make hypotheses based on a set of data and a representation

INVESTIGATION 3: *Data Projects* – Students work on planning a data-analysis project by engaging in all phases of data analysis, including collecting, organizing, representing, and interpreting data; use data representations to communicate information; describe and interpret data

Session 1: Choosing a Question to Investigate

Students choose a question to investigate and plan a data-analysis project based on their question

Sessions 2, 3, 4: Collecting, Organizing, and Representing Data

Students collect, organize, and represent the data they collected and write a summary describing and interpreting their data

Session 5: Data Projects: What Does This Graph Tell Us?

Using their previous work, students explain their representations and communicate their findings to others

Concept Map for *Timelines and Rhythm Patterns*

Students explore concepts of time and rhythm patterns during this two-week unit. During the first investigation, students explore a variety of timeline representations; during the second investigation, they explore mathematical patterns expressed in rhythms

INVESTIGATION 1: *Timelines* – Students sequence events; represent events in time; compare durations of time within a day; develop familiarity with time notation

Sessions 1, 2: What Is a Timeline?

Students assemble a timeline about the life of Dr. Seuss and discuss the important events in his life; work within a regular scale; count on a timeline

Session 3: Timeline of My Life

Students create timelines of their lives using information they collect at home; represent significant life events along an axis of time; mark discrete landmarks along the continuous axis of time

Sessions 4, 5: Special Day Timelines

Students sequence events in time; compare durations of time within a day; represent events in time

Session 6: Acting Out Timelines

Students continue their work on comparing durations of time; enact and observe events in time; experience a relative sense of time

INVESTIGATION 2: *Rhythm Patterns* – Students invent rhythm patterns using bodily movement; show sequencing and time with rhythm patterns; communicate with and interpret written symbols and codes

Session 1:

Follow-the-Leader Rhythm Game

Students invent and repeat rhythmic patterns; connect written symbols with rhythmic patterns; create visual representations to describe rhythms; interpret other students' rhythm representations

Sessions 2, 3:

Codes and Conventions

Students represent rhythmic patterns with symbols; read and interpret codes; establish conventions for communication

Session 4:

Guess My Three Rhythms

Students connect written symbols with rhythmic actions; consider ways of showing lengths of time

Session 5:

Timing and Rhythms

Students look at traditional notation that shows how people represent time in music; connect written symbols with rhythm patterns; consider ways of showing lengths of time; interpret traditional representations of time