

Grade 2 Mathematics

Full Syllabus

Illustrative Mathematics® K-5 Math (v.360)

9 Units • Unit Goals • Section Goals • Lesson-by-Lesson Outline

[Source: accessim.org/k-5/grade-2](https://accessim.org/k-5/grade-2)

Licensed CC BY-NC 4.0 • © Illustrative Mathematics

Course Overview

Grade 2 of the Illustrative Mathematics K-5 curriculum is organized into 9 units. Students build fluency with addition and subtraction within 20 and 100, extend place value to numbers within 1,000, learn to use number lines and tape diagrams, work with measurement (length, time, money), explore geometry and equal partitioning of shapes, and lay foundations for multiplication through equal groups and rectangular arrays.

The unit sequence is:

- Unit 1: Adding, Subtracting, and Working with Data
- Unit 2: Adding and Subtracting within 100
- Unit 3: Measuring Length
- Unit 4: Addition and Subtraction on the Number Line
- Unit 5: Numbers to 1,000
- Unit 6: Geometry, Time, and Money
- Unit 7: Adding and Subtracting within 1,000
- Unit 8: Equal Groups
- Unit 9: Putting It All Together

Each unit is divided into lettered sections (A, B, C, D as applicable), and each section is a sequence of daily lessons. Optional lessons (often "Center Days" or extension activities) are noted; they can be skipped or used for enrichment.

Unit 1: Adding, Subtracting, and Working with Data

Unit Goal

Students represent and solve story problems within 20 through the context of picture graphs and bar graphs that represent categorical data. Students build toward fluency with addition and subtraction.

Unit Narrative

In this unit, students begin the year-long work to develop fluency with sums and differences within 20, building on concepts of addition and subtraction from grade 1. They learn new ways to represent and solve problems involving addition, subtraction, and categorical data. In grade 1, students added and subtracted within 20 using strategies based on properties of addition and place value. They developed fluency with sums and differences within 10. Students also gained experience in collecting, organizing, and representing categorical data. In this unit, students are introduced to picture graphs and bar graphs as a way to represent categorical data. They ask and answer questions about situations described by the data. The structure of the bar graphs paves the way for a new representation, the tape diagram. Students learn that tape diagrams can be used to represent and make sense of problems involving the comparison of two quantities. The diagrams also help to deepen students' understanding of the relationship between addition and subtraction. This opening unit also offers opportunities to introduce mathematical routines and structures for centers, and to develop a shared understanding of what it means to do math and to be a part of a mathematical community.

Section A: Add and Subtract within 20

Section Goals

- Build toward fluency with adding within 100.
- Build toward fluency with subtracting within 20.

Section Narrative

This opening section gives teachers opportunities to assess students' fluency with addition and subtraction facts within 10 and monitor how students approach adding and subtracting. The first several lessons focus on making a ten as a strategy to add and subtract, which helps students gain fluency with facts within 20 and supports the work with larger numbers such as composing and decomposing numbers as a way to add and subtract. In the last lesson of the section, students use strategies learned in grade 1 to add within 50. Some activities take place in centers, enabling teachers to also introduce routines and structures while helping students develop mental strategies for adding and subtracting.

Lessons

1. **Add and Subtract within 10** — Let's add and subtract within 10.
2. **Relate Addition and Subtraction within 10** — Let's think about how addition and subtraction relate.
3. **Relate Addition and Subtraction within 20** — Let's find the number that makes each equation with 20 true.
4. **Add and Subtract Your Way** — Let's add and subtract within 20.
5. **Add within 50** — Let's add within 50.
6. **Center Day 1 (Optional)** — Let's add and subtract.

Section B: Ways to Represent Data

Section Goals

- Interpret picture graphs and bar graphs.
- Represent data using picture graphs and bar graphs.
- Solve one-step problems using addition and subtraction within 20.

Section Narrative

In this section, students explore situations and problems that involve categorical data and learn new ways to represent such data. Students begin by representing data about their class in a way that makes sense to them. Then they are introduced to picture graphs and bar graphs. Students learn the conventions of these graphs as they create them. They discuss the types of questions that can be asked and answered by the graphs, including those that require combining and comparing different categories.

Lessons

1. **Collect and Represent Data** — Let's organize data and share it.
2. **Interpret Picture Graphs** — Let's answer questions about picture graphs.
3. **Interpret Bar Graphs** — Let's answer bar graph data questions.
4. **Represent Data Using Picture Graphs and Bar Graphs** — Let's make our own bar and picture graphs.
5. **Questions about Data** — Let's ask and answer questions about bar graphs and picture graphs.
6. **Center Day 2 (Optional)** — Let's sort a collection and make graphs about it.

Section C: Diagrams to Compare

Section Goals

- Make sense of and interpret tape diagrams.
- Represent and solve Compare problems with unknowns in all positions within 100.

Section Narrative

Students have previously represented and reasoned about quantities in story problems. In grade 1, students compared quantities using diagrams with discrete partitions. In the previous section, they reasoned about quantities in bar graphs. Here students learn to use tape diagrams as another way to make sense of the relationship between two quantities and between addition and subtraction. Students explore Compare story problems with an unknown difference, an unknown larger number, and an unknown smaller number. Tape diagrams help students to visualize these structures and support them in reasoning about strategies to solve problems, such as counting on or counting back. Students also write equations to reason about questions that ask 'how many more?' and 'how many less?' They recognize that different equations and diagrams can be used to represent the same difference between two numbers.

Lessons

1. **Use Bar Graphs to Compare** — Let's use bar graphs to solve Compare problems.
2. **Use Diagrams to Compare** — Let's use bar graphs and diagrams to solve Compare problems.
3. **Diagrams with All Kinds of Compare Problems** — Let's connect problems to tape diagrams.
4. **Solve All Kinds of Compare Problems** — Let's solve Compare problems.
5. **Center Day 3 (Optional)** — Let's count objects, play addition games, and create graphs.
6. **Class Surveys (Optional)** — Let's create our own surveys to get to know our classmates.

Unit 2: Adding and Subtracting within 100

Unit Goal

Students add and subtract within 100 using strategies based on place value, properties of operations, and the relationship between addition and subtraction. They then use what they know to solve story problems.

Unit Narrative

Previously, students added and subtracted numbers within 100 using strategies they learned in grade 1, such as counting on and counting back, and with the support of tools, such as connecting cubes. In this unit, students add and subtract within 100 using strategies based on place value, the properties of operations, and the relationship between addition and subtraction. Students begin by using any strategy to find the value of sums and differences that do not involve composing or decomposing a ten. They are then introduced to base-ten blocks as a tool to represent addition and subtraction and move toward strategies that involve composing and decomposing tens. Students develop their understanding of grouping by place value, and begin to subtract one- and two-digit numbers from two-digit numbers by decomposing a ten as needed. They apply properties of operations and practice reasoning flexibly as they arrange numbers to facilitate addition or subtraction. At the end of the unit, students apply their knowledge of addition and subtraction within 100 to solve one- and two-step story problems of all types, with unknowns in all positions. To support reasoning about place value when adding and subtracting, students may choose to use connecting cubes, base-ten blocks, tape diagrams, or other representations learned in earlier units and grades.

Section A: Add and Subtract

Section Goals

- Add and subtract within 100 using strategies based on place value and the relationship between addition and subtraction. Equations and expressions in this section are limited to those like $17 + \underline{\quad} = 48$ or $65 - 23$, where composing or decomposing a ten is not required.

Section Narrative

In this section, students find the value of unknown addends using methods that are based on place value and are introduced to base-ten blocks. Students continue to rely on the relationship between addition and subtraction to solve problems involving differences. Students begin by solving Compare story problems. They use any methods and tools that make sense to them—including diagrams and connecting cubes—to find differences of two-digit numbers. Students then analyze the structure of base-ten blocks and use them to find unknown addends. Unlike connecting cubes, base-ten blocks cannot be pulled apart, which helps emphasize the structure of two-digit numbers in base ten. To reason about an unknown addend, students may add tens and ones to the known addend until they reach the value of the sum. They may also start with the total amount and subtract tens from tens and ones from ones to reach the known addend.

Lessons

1. **Add and Subtract to Compare** — Let's solve Compare problems with greater numbers.
2. **Find the Unknown Addend** — Let's find values that make the equations true.
3. **Add or Subtract to Solve Story Problems** — Let's solve story problems.
4. **Center Day 1 (Optional)** — Let's play games to practice adding and subtracting.

Section B: Decompose to Subtract

Section Goals

- Subtract within 100 using strategies based on place value, including decomposing a ten and the properties of operations.

Section Narrative

In this section, students subtract one- and two-digit numbers from two-digit numbers within 100. To reason about differences of two numbers, students use methods based on place value, base-ten blocks and diagrams, and properties of operations. The numbers here require students to decompose a ten when subtracting by place. Students also make sense of different representations of subtraction by place, including those that show their peers' reasoning. When students discuss different approaches and explain why they result in the same value, they deepen their understanding of the properties of operations and place value. The reasoning here builds a foundation for students to understand the standard algorithm for subtraction, but students should not be encouraged to use the notation for standard algorithm at this point. Allow them to build conceptual understanding by reasoning with base-ten blocks and drawings and articulating their thinking.

Lessons

1. **Subtract Your Way** — Let's subtract 1-digit numbers from 2-digit numbers.
2. **Compare Methods for Subtraction** — Let's compare ways to subtract.
3. **Subtract 2 Digits** — Let's subtract two-digit numbers.
4. **Different Ways to Decompose** — Let's compare different ways to subtract.
5. **Add and Subtract within 100** — Let's find the difference in our own way.
6. **Center Day 2 (Optional)** — Let's play games to practice adding and subtracting.

Section C: Represent and Solve Story Problems

Section Goals

- Represent and solve one- and two-step problems involving addition and subtraction within 100, including different problem types with unknowns in all positions.

Section Narrative

This section allows students to apply their knowledge to solve story problems that involve addition and subtraction within 100. The story problems include all types—Add To, Take From, Put Together/Take Apart, and Compare—and have unknowns in all positions. Previously, students worked with diagrams that represent Compare problems. Throughout this section, students also make sense of diagrams that could represent Put Together/Take Apart story problems. As students relate quantities in context and diagrams that represent them, they practice reasoning quantitatively and abstractly. For Add To/Take From story problems, the best representations show the actions of the story in the correct order. Throughout the section, students are invited to interpret and solve problems in the ways that make sense to them. Math tools, such as connecting cubes and base-ten blocks, should be made available to encourage methods based on place value and the properties of operations to solve the problems.

Lessons

1. **How Do You Solve Story Problems?** — Let's solve story problems.
2. **Story Problems and Diagrams** — Let's make sense of diagrams and solve story problems.
3. **Story Problems and Equations** — Let's make sense of equations and solve story problems.
4. **Solve It Your Way** — Let's solve story problems and share our thinking with others.
5. **Does My Estimation Make Sense?** — Let's decide if estimates make sense.
6. **Center Day 3 (Optional)** — Let's use diagrams to make and solve our own story problems.

7. **Our Store's Inventory (Optional)** — Let's think about how to run a store.

Unit 3: Measuring Length

Unit Goal

Students measure and estimate lengths in standard units and solve measurement story problems within 100.

Unit Narrative

This unit introduces students to standard units of lengths in the metric and customary systems. In grade 1, students expressed the lengths of objects in terms of multiple copies of a shorter object laid end to end without gaps or overlaps. The length of the shorter object serves as the unit of measurement. In this unit, students learn about standard units of length: centimeters, meters, inches, and feet. They examine how different measuring tools represent length units, learn how to use measurement tools, and measure and estimate the lengths of objects. Along the way, students notice that the length of the same object can be described with different measurements and relate this to differences in the size of the unit used to measure. Throughout the unit, students solve one- and two-step story problems involving addition and subtraction of lengths. To make sense of and solve these problems, they use previously learned strategies for adding and subtracting within 100, including strategies based on place value. To close the unit, students learn that line plots can be used to represent numerical data. They create and interpret line plots that show measurement data and use them to answer questions about the data. Students relate the structure of a line plot to the tools they use to measure lengths. This prepares students for the work in the next unit, where they interpret numbers on the number line as lengths from 0. The number line is an essential representation that will be used in future grades and throughout students' mathematical experiences.

Section A: Metric Measurement

Section Goals

- Measure length in centimeters and meters.
- Represent and solve one-step story problems within 100.

Section Narrative

This section introduces two metric units: centimeter and meter. Students use base-ten blocks, which have lengths of 1 centimeter and 10 centimeters, to measure objects in the classroom and to create their own centimeter ruler. Students iterate the 1-centimeter unit just as they had done with non-standard units in grade 1. Students relate the side length of a centimeter cube to the distance between tick marks on their ruler. Students see that each tick mark represents the distance in centimeters from the 0 mark, and that the length units accumulate as they move along the ruler and away from 0. Students then compare the ruler they created to a standard centimeter ruler. They learn the importance of placing the end of an object at 0 and discuss how the numbers on the ruler represent lengths from 0. Students also learn about a longer unit in the metric system, meter, and use it to estimate lengths. They have opportunities to choose measurement tools and to do so strategically, by considering the lengths of objects being measured. Students also measure the length of longer objects in both centimeters and meters, which prompts them to relate the size of the unit to the measurement. To close the section, students apply their knowledge of measurement to compare the lengths of objects and solve Compare story problems involving lengths within 100, measured in metric units.

Lessons

1. **Standard Units of Measure** — Let's measure length.
2. **Measure in Centimeters** — Let's measure in centimeters.
3. **Create and Use a Ruler** — Let's make rulers to measure and compare lengths in centimeters.

4. **Measure and Estimate in Centimeters** — Let's estimate and measure in centimeters.
5. **Measure in Meters** — Let's measure lengths in meters.
6. **Compare Reptile Lengths in Story Problems** — Let's solve story problems about reptile lengths.
7. **Center Day 1 (Optional)** — Let's practice addition and subtraction.

Section B: Customary Measurement

Section Goals

- Measure length in feet and inches.
- Represent and solve one- and two-step story problems within 100.

Section Narrative

In this section, students apply measurement concepts and skills from earlier to measure and estimate lengths in two customary units: inches and feet. As in the previous section, students make choices about the tool to use based on the length of the object being measured and measure the length of the same object in both feet and inches. They begin to generalize that when they use a longer length unit, fewer of those units are needed to span the full length of the object. This understanding is a foundation for their work with fractions in grade 3 and beyond. To solidify their understanding of measurement concepts, students also solve one- and two-step story problems involving addition and subtraction of lengths within 100, expressed in customary units. Some problems involve measurements using a 'torn tape' where the 0 cannot be used as a starting point.

Lessons

1. **What Is an Inch?** — Let's measure in inches.
2. **From Feet to Inches** — Let's measure longer lengths with U.S. units.
3. **Measure with a Torn Tape** — Let's measure without starting at 0.
4. **Saree Silk Stories: Necklaces and Bracelets** — Let's solve story problems about length.
5. **Saree Silk Stories: Friendship Bracelets** — Let's solve 2-step story problems about length.
6. **Center Day 2 (Optional)** — Let's estimate and measure objects.

Section C: Line Plots

Section Goals

- Represent numerical data on a line plot.

Section Narrative

In this section, students apply their understanding of measurement and data to create and interpret line plots. Students learn that the horizontal scale is marked off in whole-number length units, the same ones used to collect the data. Students recognize that the numbers on the number line represent lengths and each 'x' above a number represents an object of that length. They label line plots with titles and the measurement unit used. Throughout the section, students connect the features of the line plot to the tools they use to measure.

Lessons

1. **What Is a Line Plot?** — Let's learn a new way to represent data.
2. **Create Line Plots** — Let's represent data in line plots.
3. **Interpret Measurement Data** — Let's represent and make sense of data in line plots.
4. **Center Day 3 (Optional)** — Let's measure to create line plots and add and subtract within 100.

5. **Make a Yardstick (Optional)** — Let's make a yardstick.

Unit 4: Addition and Subtraction on the Number Line

Unit Goal

Students learn about the structure of a number line and use it to represent numbers within 100. They also relate addition and subtraction to length and represent the operations on the number line.

Unit Narrative

In this unit, students are introduced to the number line, an essential representation that will be used throughout students' K-12 mathematical experience. They learn to use number lines to represent whole numbers, sums, and differences. In a previous unit, students learned to measure length with rulers. Here, they see that the tick marks and numbers on the number line are like those on a ruler: both show equally spaced numbers that represent lengths from 0. Students use this understanding of structure to locate and compare numbers on number lines and to estimate numbers represented by points on number lines. Students then learn conventions for representing addition and subtraction on a number line: using arrows pointing to the right for adding and arrows pointing to the left for subtracting. Students also use number lines to represent addition and subtraction methods discussed in Number Talks, such as counting on, counting back by place, and decomposing a number to get to a ten. The reasoning here deepens students' understanding of the relationship between addition and subtraction. The number lines in this unit show a tick mark for every whole number in the given range, though not all may be labeled with the numeral. As students become more comfortable with this representation, they may draw number lines that show only the numbers needed to solve the problems, which is acceptable.

Section A: The Structure of the Number Line

Section Goals

- Represent whole numbers within 100 as lengths from 0 on a number line.
- Understand the structure of the number line.

Section Narrative

In this section, students begin to use the number line as a tool for understanding numbers and number relationships. They learn that the number line is a visual representation of numbers shown in order from left to right, with equal spacing between each number. Students see that each number tells the number of length units from 0, just like on the ruler. This means that the whole numbers to the left on a number line are smaller (fewer units away from 0), and those farther to the right are larger (more units away from 0). Students learn that whole numbers can be represented with tick marks and points on the number line. Students then locate, label, and compare whole numbers on a number line. They also estimate numbers that could be represented by points on a number line.

Lessons

1. **Whole Numbers on the Number Line** — Let's represent numbers on a number line.
2. **Features of a Number Line** — Let's explore the features of a number line.
3. **Unlabeled Tick Marks** — Let's locate numbers on the number line.
4. **Compare Numbers on a Number Line** — Let's use the number line to compare numbers.
5. **Estimate on a Number Line** — Let's estimate numbers on a number line.
6. **Center Day 1 (Optional)** — Let's put numbers on a number line.

Section B: Add and Subtract on a Number Line

Section Goals

- Represent sums and differences on a number line.

Section Narrative

In this section, students reason about sums and differences on the number line. They begin by using directional arrows: an arrow pointing right represents addition, and an arrow pointing left represents subtraction. Students write equations that correspond to given number-line representations, as well as represent given equations on number lines. Later, students revisit the idea of subtraction as an unknown-addend problem and represent the unknown addend with a jump to the right. As students analyze various representations of a difference on the number line, they consider when certain strategies may be more efficient than others. They also consider reasoning strategies that are based on place value and the properties of operations, such as adding tens and then ones or adding ones and then tens. At the end of the section, students use the number line to make sense of and solve story problems. They compare this representation with others used in earlier units.

Lessons

1. **Addition and Subtraction on the Number Line** — Let's match equations to number lines.
2. **Equations on a Number Line** — Let's write equations and represent them on a number line.
3. **The Difference between Numbers** — Let's represent ways to subtract on the number line.
4. **Place Value and the Number Line** — Let's compare methods using the number line.
5. **Different Ways to Add and Subtract** — Let's add and subtract by using a ten.
6. **Equations with Unknowns** — Let's represent addition and subtraction with number lines and with equations using a ? for the unknown.
7. **Represent Story Problems** — Let's compare representations and solve problems.
8. **Center Day 2 (Optional)** — Let's practice adding and subtracting using the number line.
9. **Tall Enough to Ride (Optional)** — Let's find out what amusement park rides people are tall enough to ride.

Unit 5: Numbers to 1,000

Unit Goal

Students extend place value understanding to three-digit numbers.

Unit Narrative

In this unit, students extend their knowledge of the units in the base-ten system to include hundreds. In grade 1, students learned that a ten is a unit made up of 10 ones, and two-digit numbers are formed using units of tens and ones. In this unit, students learn that a hundred is a unit made up of 10 tens, and three-digit numbers are formed using units of hundreds, tens, and ones. To make sense of numbers in different ways and to build flexibility in reasoning with them, students work with a variety of representations: base-ten blocks, base-ten diagrams or drawings, number lines, expressions, and equations. At the start of the unit, students express a quantity in terms of the number of units represented by base-ten blocks (3 hundreds, 14 tens, 22 ones). They practice composing larger units from smaller units and representing the value using the fewest number of each unit (4 hundreds, 6 tens, 2 ones). They connect the number of units to three-digit numerals (462). Next, students make sense of three-digit numbers on the number line. In a previous unit, students learned about the structure of the number line by representing whole numbers within 100 as lengths from 0. They get a sense of the relative distance of whole numbers within 1,000 from 0. Students learn to count to 1,000 by skip-counting on a number line by 10 and 100. They also locate, compare, and order three-digit numbers on a number line. Throughout the unit, the numbers 100, 200, 300, 400, 500, 600, 700, 800, 900 are referred to as multiples of 100. The same is true for multiples of 10. 'Multiple' is not a word that students are expected to understand or use in grade 2. Students can describe the numbers as a number of tens or hundreds, such as '20 tens' or '3 hundreds.'

Section A: The Values of Three Digits

Section Goals

- Read, write, and represent three-digit numbers using base-ten numerals and expanded form.
- Use place value understanding to compose and decompose three-digit numbers.

Section Narrative

This section introduces the unit of a hundred. Students begin by analyzing the large square base-ten block, and its corresponding base-ten diagram. They recognize 100 as 1 hundred, 10 tens, or 100 ones. Students learn that the digits in three-digit numbers represent amounts of hundreds, tens, and ones. They use this insight to write numbers and represent quantities in different forms—base-ten numerals, words, and expanded form. Students see that they can compose a hundred with 10 tens, just as they can compose a ten with 10 ones, and that a quantity can be expressed in many ways. Composing larger units from smaller units allows students to express a quantity using the fewest number of each unit. This understanding reinforces the meaning of the digits in a three-digit number and prepares students to add and subtract such numbers later. It also lays the foundation for generalizing the relationship between the digits of other numbers in the base-ten system in future grades.

Lessons

1. **How Do We Compose a Hundred?** — Let's compose a hundred.
2. **Make Hundreds** — Let's represent hundreds in different ways.
3. **Compose 3-Digit Numbers** — Let's compose 3-digit numbers.
4. **Write 3-Digit Numbers** — Let's represent 3-digit numbers using base-ten numerals.

5. **Expanded Form of Numbers** — Let's represent 3-digit numbers as a sum of the value of each digit.
6. **Represent Numbers in Different Ways** — Let's represent numbers in different ways.
7. **Center Day 1 (Optional)** — Let's use place value to identify numbers and practice adding and subtracting.

Section B: Compare and Order Numbers within 1,000

Section Goals

- Compare and order three-digit numbers using place value understanding and the relative position of numbers on a number line.
- Represent whole numbers up to 1,000 as lengths from 0 on a number line.

Section Narrative

In this section, students use number line diagrams to deepen their understanding of numbers to 1,000. They begin by skip-counting on the number line to build a sense of the relative position of numbers to 1,000. They recall the structure of the number line from a previous unit and use it, along with their understanding of place value, to locate, compare, and order numbers on the number line. As students locate or estimate the location of three-digit numbers on number lines, they show an understanding of a number's relative distance from 0 and the place value of the digits. This understanding helps them to compare and order three-digit numbers. Students see that the numbers get larger as they move from left to right on the line. To compare and order three-digit numbers written as base-ten numerals, students also continue to use base-ten blocks, base-ten diagrams, or other representations that make sense to them. Students write the comparisons using the symbols $<$, $>$, and $=$.

Lessons

1. **Three-Digit Numbers on the Number Line** — Let's locate and represent 3-digit numbers on the number line.
2. **Compare Numbers on the Number Line** — Let's compare numbers on the number line.
3. **Place Value Comparisons (Part 1)** — Let's use place value to compare 3-digit numbers.
4. **Place Value Comparisons (Part 2)** — Let's compare 3-digit numbers using place value.
5. **Order Numbers** — Let's put numbers in order.
6. **Center Day 2 (Optional)** — Let's work on place value.
7. **Around the School (Optional)** — Let's think about what numbers can represent in a school.

Unit 6: Geometry, Time, and Money

Unit Goal

Students reason with shapes and their attributes, and partition shapes into equal shares, building a foundation for fractions. They relate halves, fourths, and skip-counting by 5 to tell time, and they solve story problems involving the values of coins and dollars.

Unit Narrative

In this unit, students transition from place value and numbers to geometry, time, and money. In grade 1, students distinguished between defining and nondefining attributes of shapes, including triangles, rectangles, trapezoids, and circles. Here, they continue to look at attributes of a variety of shapes and see that shapes can be identified by the numbers of sides and vertices (corners). Students then study three-dimensional (solid) shapes, and identify the two-dimensional (flat) shapes that make up the faces of these solid shapes. Next, students look at ways to partition shapes and create equal shares. They extend their knowledge of halves and fourths (or quarters) from grade 1 to now include thirds. Students compose larger shapes from smaller equal-size shapes and partition shapes into two, three, and four equal pieces. As they develop the language of fractions, students also recognize that a whole can be described as two halves, three thirds, or four fourths, and that equal-size pieces of the same whole need not have the same shape. Later, students use their understanding of halves and fourths (or quarters) to tell time. In grade 1, they learned to tell time to the half hour. Here, they relate a quarter of a circle to the features of an analog clock. They use 'quarter past' and 'quarter till' to describe time, and skip-count to tell time in 5-minute intervals. They also learn to associate the notations 'a.m.' and 'p.m.' with their daily activities. To continue to build fluency with addition and subtraction within 100, students conclude the unit with a money context. They skip-count, count on from the greatest value, and group like coins, and then add or subtract to find the value of a set of coins. Students also solve one- and two-step story problems involving sets of dollars and different coins, and use the symbols \$ and ¢.

Section A: Attributes of Shapes

Section Goals

- Identify triangles, quadrilaterals, pentagons, hexagons, and cubes.
- Recognize and draw shapes having specific attributes, such as a given number of angles or a given number of equal faces.

Section Narrative

In this section, students identify and draw triangles, quadrilaterals, pentagons, and hexagons. Students are likely familiar with triangles and hexagons given their previous work with pattern blocks. Here, they see that hexagons include any shape with 6 sides and 6 corners, and may look different from the pattern block they worked with in the past. Students learn to name a shape by counting the sides and corners and come to see that, in any shape, the number of corners is the same as the number of sides. (The term 'corners' is used in lieu of 'vertices' because the latter requires an understanding of angles, which is developed in grade 4.) Students come to recognize that some shapes such as rectangles and squares have 'square corners,' the informal language for 90-degree angles. As they identify and draw shapes with given attributes, they measure length in centimeters and inches, revisiting previously learned skills. At the end of the section, students relate two-dimensional (flat) shapes to three-dimensional (solid) shapes. They see that flat shapes make up the faces of solid shapes and identify solid shapes based on the flat shapes that constitute them.

Lessons

1. **Identify and Sort Shapes** — Let's sort and name shapes, based on their sides and corners.
2. **Draw Shapes** — Let's recognize and draw triangles, quadrilaterals, pentagons, and hexagons.

3. **Specific Side Lengths** — Let's find and draw shapes with specific side lengths.
4. **Solid Shapes** — Let's identify and describe solid shapes.
5. **Center Day 1 (Optional)** — Let's work with shapes.

Section B: Halves, Thirds, and Fourths

Section Goals

- Partition rectangles and circles into halves, thirds, and fourths and name the pieces.
- Recognize two halves, three thirds, and four fourths as one whole.
- Understand that equal pieces do not need to be the same shape.

Section Narrative

In this section, students learn that shapes can be partitioned into two, three, or four equal pieces called 'halves,' 'thirds,' and 'fourths' or 'quarters,' respectively. Students begin by composing shapes, using pattern blocks in any combination. Later, they use a single type of pattern block, which allows them to see the composed shape partitioned into equal pieces. In grade 1, students partitioned shapes into two and four equal pieces, and described each piece as a 'half' or a 'fourth' or 'quarter.' (To prepare students to tell time to the quarter hour in the next section, be sure that they hear and use the terms 'fourths' and 'quarters' interchangeably.) Here, they add the term 'thirds' to their vocabulary and partition rectangles into halves, thirds, and fourths. Students then identify equal-size pieces in shapes, which are partitioned in different ways to build an understanding that equal-size pieces of the same whole do not need to be the same shape. They come to understand that if the whole is partitioned into the same number of equal pieces, the names of the pieces are the same. Students also learn that two halves, three thirds, and four fourths each make up one whole. Although students are expected to use the language of fractions (halves, thirds, and fourths), they are not expected to use the word 'fraction' or see fractions in numerical form until grade 3.

Lessons

1. **Compose and Decompose Shapes** — Let's make shapes with equal-size smaller shapes.
2. **Make Halves, Thirds, and Fourths** — Let's make halves, thirds, and fourths (or quarters).
3. **Are All Pieces Created Equal?** — Let's make halves, thirds, and fourths in different ways.
4. **You Took the Whole Thing!** — Let's talk about the whole.
5. **Center Day 2 (Optional)** — Let's work with shapes.

Section C: Time on the Clock

Section Goals

- Tell and write time from analog and digital clocks to the nearest five minutes, using a.m. and p.m.

Section Narrative

In this section, students use their understanding of fourths and quarters to tell time. In grade 1, students learned to tell time to the hour and half hour. Here, they make a connection between the analog clock and circles partitioned into halves or fourths. Students use the phrases 'half past,' 'quarter past,' and 'quarter till' to tell time. They skip-count by 5 to tell time in 5-minute intervals. Students recognize that the hour hand on an analog clock moves toward the next hour as time passes. They represent time on analog clocks by drawing the hour and minute hands and writing the time with digits. Students recognize that, as time passes, the hour hand on an analog clock moves toward the next hour. They learn that each hour comes around twice a day on a 12-hour clock, and is labeled with 'a.m.' and 'p.m.' to distinguish between the times of day. Toward the end of this section, students relate a.m. and p.m. times to their daily activities.

Lessons

1. **Tell Time with Halves and Quarters** — Let's tell time with halves and quarters.
2. **Count by 5 to Tell Time** — Let's tell time.
3. **Is It a.m. or p.m.?** — Let's read and write times, using a.m. or p.m.
4. **Center Day 3 (Optional)** — Let's notice shapes in books, and practice adding and subtracting.

Section D: The Value of Money

Section Goals

- Find the value of a group of bills and coins.
- Use addition and subtraction within 100 to solve one- and two-step word problems.

Section Narrative

In this section, students learn about money concepts while continuing to develop fluency with addition and subtraction within 100. They identify coins, such as quarters, dimes, nickels, and pennies, and find the total value of different coin combinations. Students learn that 1 dollar has the same value as 100 cents, and then solve problems involving dollars and cents. Although students will not need to use decimal notation to represent money, they are expected to appropriately use the symbols \$ and ¢. Students are likely to have some previous experience with dollars and cents. Encourage them to share their experiences throughout the section. Consider creating an anchor chart of pictures of each coin and their values so that all students can access the content. As much as possible, give students access to real or plastic coins to support their reasoning.

Lessons

1. **Identify Pennies, Nickels, and Dimes** — Let's learn about coins and their values.
2. **Identify Quarters** — Let's learn about quarters and find the value of different sets of coins.
3. **Let's Make a Dollar** — Let's make a dollar.
4. **Money Problems** — Let's solve money problems.
5. **More Money Problems** — Let's solve money problems with a lot of dollars.
6. **Does My Answer Make Sense?** — Let's decide if our answers make sense.
7. **Center Day 4 (Optional)** — Let's compare coin collections and work with shapes.
8. **Spending Money (Optional)** — Let's think about spending money.

Unit 7: Adding and Subtracting within 1,000

Unit Goal

Students use place value understanding, the relationship between addition and subtraction, and properties of operations to add and subtract within 1,000.

Unit Narrative

In this unit, students add and subtract within 1,000, with and without composing and decomposing a base-ten unit. Previously, students added and subtracted within 100, using methods such as counting on, counting back, and composing or decomposing a ten. Here, they apply the methods they know and their understanding of place value and three-digit numbers to find sums and differences within 1,000. Initially, students add and subtract, without composing or decomposing a ten or a hundred. Instead, they rely on methods based on the relationship between addition and subtraction and the properties of operations. They make sense of sums and differences, using counting sequences, number relationships, and representations (number lines, base-ten blocks, base-ten diagrams, and equations). As the unit progresses, students work with numbers that prompt them to compose and decompose one or more units, eliciting strategies based on place value. When adding and subtracting by place, students first compose or decompose only a ten, then either a ten or a hundred, and finally both a ten and a hundred. They also make sense of and connect different ways to represent place-value strategies. Students learn to recognize when composition or decomposition is a useful strategy for adding or subtracting by place. In the later half of the unit, they encounter lessons that encourage them to think flexibly and to use strategies that make sense to them, based on number relationships, properties of operations, and the relationship between addition and subtraction.

Section A: Add and Subtract within 1,000, without Composition or Decomposition

Section Goals

- Add and subtract numbers within 1,000, without composition or decomposition, and use strategies based on the relationship between addition and subtraction and the properties of operations.

Section Narrative

In this section, students add and subtract within 1,000, using methods where they do not explicitly compose or decompose a ten or a hundred. The number line is used early in this section to help students recognize that when numbers are relatively close, students can count on or count back to find the value of the difference. Students also analyze counting sequences of three-digit numbers that increase or decrease by 10 or 100. They observe patterns in place value before adding and subtracting multiples of 10 or by 100. Students then engage with problems and expressions that encourage them to reason about sums and differences, using the relationship between addition and subtraction and the properties of operations. Later in the section, students analyze and make connections between methods that use different representations, such as number lines, base-ten diagrams, and equations. They then use methods or representations that make sense to them to add and subtract three-digit numbers.

Lessons

1. **Compare, Count On, and Count Back** — Let's compare numbers and add or subtract.
2. **Add and Subtract with Tens and Hundreds** — Let's add and subtract tens or hundreds.
3. **Count On or Count Back to Subtract** — Let's find the difference between numbers.

4. **Add and Subtract 3-Digit Numbers in Different Ways** — Let's add and subtract 3-digit numbers.
5. **Center Day 1 (Optional)** — Let's add numbers within 1,000.

Section B: Add within 1,000, Using Place-Value Strategies

Section Goals

- Add numbers within 1,000, using strategies based on place-value understanding, including composing a ten or a hundred.

Section Narrative

In this section, students use strategies based on place value to add three-digit numbers. They learn that it is sometimes necessary to compose a hundred from 10 tens to find the values of such sums. Students begin with sums that allow them to decide when to make a ten. They then work with greater values in the tens place and determine when to compose a hundred. As the lessons progress, they encounter sums of two- and three-digit numbers that involve composing two units. Throughout the section, students analyze and use representations, such as base-ten blocks, base-ten diagrams, expanded form, and other equations, to build conceptual understanding and show place-value reasoning. They also develop their understanding of the properties of operations as they observe that the order in which they add the units doesn't affect the value of the sum. Later in the section, students add within 1,000, using any method they have learned and thinking flexibly about the numbers they are adding.

Lessons

1. **Use a Ten to Add within 1,000** — Let's add 3-digit numbers by composing a ten.
2. **Compose a Greater Unit** — Let's add 3-digit numbers and compose tens or hundreds.
3. **Compose Tens and Hundreds to Add** — Let's compose tens and hundreds to add.
4. **Add 3-Digit Numbers** — Let's practice adding within 1,000.
5. **Add within 1,000** — Let's find sums within 1,000 and explain our strategies.
6. **Center Day 2 (Optional)** — Let's add numbers within 1,000.

Section C: Subtract within 1,000, Using Place-Value Strategies

Section Goals

- Subtract numbers within 1,000 using strategies based on place value understanding, including decomposing a ten or hundred.

Section Narrative

As they have done when adding, students subtract numbers within 1,000, using place-value strategies that involve decomposing a ten, a hundred, or both. This work builds on their previous experience of subtracting two-digit numbers by place value and decomposing a ten. Students use base-ten blocks to subtract hundreds from hundreds, tens from tens, and ones from ones, which offers a concrete experience of exchanging a ten for 10 ones or a hundred for 10 tens as needed. Along the way, they begin to think strategically about how to decompose the minuend when using base-ten blocks or diagrams. They learn that by analyzing the value of the digits in each place, they can initially represent the minuend in a way that would require decomposing fewer units when subtracting by place. Throughout the section, students compare the steps they use to decompose units and the different ways to represent and record the units that are decomposed. The section ends with students choosing subtraction methods flexibly. They apply their understanding of place value, the relationship between addition and subtraction, and the properties of operations, to analyze number relationships and decide how to find the value of a difference within 1,000.

Lessons

1. **Decompose to Subtract** — Let's subtract within 1,000.
2. **Decompose Tens or Hundreds** — Let's decompose a ten or a hundred to subtract.
3. **Think Before You Subtract** — Let's think about decomposing before subtracting.
4. **Decompose a Ten and a Hundred to Subtract** — Let's subtract within 1,000.
5. **Subtract within 1,000** — Let's subtract in a way that makes sense.
6. **Does It Make Sense? (Optional)** — Let's decide if our answers make sense.
7. **Center Day 3 (Optional)** — Let's add and subtract 3-digit numbers.
8. **Book Drive (Optional)** — Let's organize information about a book drive.

Unit 8: Equal Groups

Unit Goal

Students work with equal groups of objects to gain foundations for multiplication.

Unit Narrative

In this unit, students develop an understanding of equal groups, building on their experiences with skip-counting and with finding the sums of equal addends. The work here serves as the foundation for multiplication and division in grade 3 and beyond. Students begin by analyzing even and odd numbers of objects. They learn that any even number can be split into 2 equal groups or into groups of 2, with no objects left over. Students use visual patterns to identify whether numbers of objects are even or odd. Next, students learn about rectangular arrays. They describe arrays using mathematical terms, such as 'rows' and 'columns.' Students see the total number of objects as a sum of the objects in each row and as a sum of the objects in each column, which they express by writing equations with equal addends. Students also recognize that there are many ways of seeing the equal groups in an array. Later, students transition from working with arrays that contain discrete objects to equal-size squares within a rectangle. Students build rectangular arrays using inch tiles and partition rectangles into rows and columns of equal-size squares. The work here sets the stage for the concept of area in grade 3.

Section A: Odd and Even

Section Goals

- Determine whether a group of objects (up to 20) has an odd or even number of members.
- Write an equation to express an even number as a sum of two equal addends.

Section Narrative

In this section, students learn about odd and even numbers, building on their experience with sharing objects with another person or with making pairs out of a set of objects. They begin by noticing that some groups of objects can be made into two equal groups without a 'leftover' and other groups can be made into two equal groups with '1 leftover.' The same pattern can be seen when pairing objects. After learning the terms 'even' and 'odd,' students focus on explaining why a group has an even number or an odd number of members. They do so by showing whether the objects can be made into 2 equal groups or paired without any leftover objects, or whether they can skip-count by 2 to count the entire collection. The representations used here support students as they progress from explaining even and odd numbers informally to doing so more formally. They also pave the way for students to make sense of representations of multiplication in grade 3. Early lessons of this unit encourage the teacher to record student thinking using diagrams of equal groups or by arranging objects in rows and columns. Both of these recording strategies help students see and count pairs of objects.

Lessons

1. **Can You Share?** — Let's equally share groups of objects.
2. **Partners Make Pairs** — Let's make pairs with groups of objects.
3. **Is It Odd or Even?** — Let's explain why the number of objects in a group is even or odd.
4. **Decompose Even and Odd Numbers** — Let's represent even and odd numbers.
5. **Patterns with Even and Odd Numbers (Optional)** — Let's look for patterns with even and odd numbers.
6. **Center Day 1 (Optional)** — Let's skip-count and practice addition and subtraction.

Section B: Rectangular Arrays

Section Goals

- Partition rectangles into rows and columns of equal-size squares, and count to find the total number of squares.
- Represent the total number of objects in an array as a sum of equal addends.
- Use addition to find the total number of objects arranged in rectangular arrays with up to 5 rows and up to 5 columns.

Section Narrative

In this section, students learn that a rectangular array contains objects arranged into rows and columns, with the same number of objects in each row and the same number of objects in each column. Using this structure, students can skip-count by the number in each row or in each column to find the total number of objects. They can also write equations with equal addends representing the number of objects in a row or a column. Later in the section, students relate their work with arrays to the partitioning of shapes into equal parts. Students build rectangles by arranging square tiles into rows and columns, and then partition rectangles into rows and columns. Rectangles in this section have up to 5 rows and 5 columns. Students are not expected to name the fractional units created by partitioning shapes. The focus is on using the structure of the rows and columns created by the partitions to count the total number of equal-size squares. This work serves as a foundation for students' future study of multiplication and area measurement.

Lessons

1. **What Is an Array?** — Let's learn about arrays.
2. **Count Columns and Objects in Columns** — Let's learn about columns in arrays.
3. **A Sum of Equal Addends** — Let's match expressions with arrays.
4. **Write Expressions and Equations to Represent Arrays** — Let's write equations to represent arrays.
5. **Arrays and Rectangles** — Let's make arrays and rectangles using tiles.
6. **Partition Rectangles into Squares** — Let's partition rectangles into squares.
7. **Center Day 2 (Optional)** — Let's skip-count and practice addition and subtraction.
8. **A Band Concert (Optional)** — Let's arrange seats for a concert.

Unit 9: Putting It All Together

Unit Goal

Students consolidate and solidify their understanding of various concepts and skills related to major work of the grade. They also continue to work toward fluency goals of the grade.

Unit Narrative

In this unit, students revisit major work and fluency goals of the grade, applying their learning from the year. The first section gives students a chance to solidify their fluency with addition and subtraction within 20. In the second section, students apply methods they used with smaller numbers to add and subtract numbers within 100. Students also revisit numbers within 1,000: composing and decomposing three-digit numbers in different ways and using methods based on place value to find their sums and differences. In the final section, students interpret, solve, and write story problems involving numbers within 100, which further develops their fluency with addition and subtraction of two-digit numbers. Students work with all problem types with the unknown in all positions. The sections in this unit are standalone sections, not required to be completed in order. The goal is to offer ample opportunities for students to integrate the knowledge they have gained and to practice skills related to the expected fluencies of the grade.

Section A: Fluency within 20 and Measurement

Section Goals

- Fluently add and subtract within 20.

Section Narrative

In this section, students practice adding and subtracting within 20 to meet the fluency expectations of the grade, which include finding all sums and differences within 20, and knowing from memory all sums of 2 one-digit numbers. Students begin with exercises and games that emphasize using the relationship between addition and subtraction to find the value of expressions and unknown addends. When students encounter sums and differences they don't know right away, they use mental math strategies and other methods they have learned, such as using facts they know, making equivalent expressions, and composing or decomposing a number to make a 10. Later in the section, students apply their mental strategies to find sums and differences within 20 in a measurement context. They measure standard lengths and create line plots, and then use the measurements to add and subtract.

Lessons

1. **Sums and Differences within 20** — Let's find the value of sums and differences mentally.
2. **Fluency Flip** — Let's add and subtract fluently.
3. **Measure on a Map** — Let's add and subtract length measurements.
4. **Measure and Plot** — Let's create line plots and add and subtract measurements of length.

Section B: Numbers to 1,000

Section Goals

- Add and subtract within 1,000 using strategies based on place value and the properties of operations.
- Fluently add and subtract within 100.

Section Narrative

In this section, students revisit numbers within 1,000 and develop their facility with addition and subtraction within 100. The work here requires students to compose and decompose multiple place-

value units, which reinforces their understanding of place value and operations on larger numbers. Students begin by decomposing and composing three-digit numbers in multiple ways using base-ten blocks, base-ten diagrams, words, and symbols. They also compose and decompose units as they match and create equivalent expressions for three-digit numbers. Next, students practice addition and subtraction within 1,000. They analyze sums and differences and reason about which ones are more difficult to evaluate and which are easier, deepening their understanding of composition and decomposition based on place value. Students then work toward fluent addition and subtraction within 100, which requires composing or decomposing one unit when using methods based on place value. Methods for finding sums and differences mentally, without explicitly composing or decomposing units, are also encouraged.

Lessons

1. **Compose and Decompose Numbers within 1,000** — Let's represent numbers in many different ways.
2. **Represent Numbers with Expressions** — Let's compose and decompose numbers to make expressions with the same value.
3. **Add and Subtract within 1,000** — Let's add and subtract within 1,000.
4. **Add and Subtract within 100** — Let's fluently add and subtract within 100.

Section C: Create and Solve Story Problems

Section Goals

- Represent and solve one- and two-step story problems within 100.

Section Narrative

In this section, students create and solve one- and two-step story problems with unknown values in all positions. They discuss how they make sense of the problem and share their methods for solving. By now, students are expected to solve all types of story problems within 100, using methods and representations that make sense to them. They continue to make connections across representations, with a focus on equations and tape diagrams, which will be used frequently in grade 3. Students analyze stories and determine the types of questions that could be asked based on the provided information. Then, they write their own story problems based on images and their own experiences.

Lessons

1. **Sort the Story Problems** — Let's analyze story problems.
2. **What's the Question?** — Let's determine the question in story problems.
3. **All about Tape Diagrams** — Let's match diagrams, story problems, and equations.
4. **What's the Story?** — Let's write story problems.
5. **Let's Solve Our Story Problems** — Let's solve, represent, and share story problems.