Core Knowledge® MATHEMATICS

Adding, Subtracting, and Working with Data

Teacher Guide

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Teacher Guide

Core Knowledge Mathematics™

Introduction to the CKMath Program

Welcome to the Core Knowledge Math™ (CKMath) program, based on the carefully researched and designed Illustrative Math™ (IM) instructional materials. IM K-12 Math is a problem-based core curriculum that believes all students are able to understand and use mathematics. Students learn about math by doing math. They bring their current understanding of math and their world experiences to the classroom. In these lessons, students take an active role in the learning process by building on their previous knowledge, and by exploration to develop conceptual understanding instead of being told how to solve problems. Doing math includes: understanding problems, reasoning abstractly and quantitatively, making arguments and critiquing the reasoning of others, modeling with mathematics, making appropriate use of tools, attending to precision in their use of language, looking for and making use of structure, and expressing regularity in repeated reasoning. Encouraging students to participate in mathematical practices with other students gives the opportunity for them to perceive themselves as mathematical thinkers and as part of a mathematical community. By observing students' understanding of concepts and their thought processes, teachers are able to direct student learning and guide them to recognize the connection between concepts and procedures.

Organization of Units and Lessons

Each unit is divided into sections. Each section revolves around specific goals.

- The **Section Overview** identifies the learning goals for each section of the unit and describes how students will work towards these goals. Sections are labeled by letters; e.g. Section A, Section B, and so on. Each section uses scaffolding to identify the Common Core Standards that apply to that section. In Second Grade, there are four areas covered by the Common Core Standards. They include Operations and Algebraic Thinking (2.OA), Number and Operations in Base Ten (2.NBT), Measuring and Data (2.MD), and Geometry (2.G).

  The standards in each section are divided into three groups: **Building On, Addressing, and Building Towards**. A standard that reflects the work of prior grades and is being used to bridge to a grade-level standard is indicated as *Building On*. When the standard is focused on the grade-level work, the alignment is indicated as *Addressing*. A standard that is indicated as *Building Towards* means that the standard has not yet been achieved by the activities in that section.

- The **Standards for Mathematical Practice (MP)** describe the types of thinking and behaviors students engage in as they are doing mathematics. Throughout the curriculum, the Teacher Guide identifies lessons and activities where different Mathematical Practices are likely to be observed.

  Standards for Mathematical Practice Student Facing Learning Targets

  MP1 I Can Make Sense of Problems and Persevere in Solving Them
  - I can ask questions to make sure I understand the problem.
  - I can say the problem in my own words.
  - I can keep working when things aren't going well and try again.
  - I can show at least one try to figure out or solve the problem.
  - I can check that my solution makes sense.

  MP2 I Can Reason Abstractly and Quantitatively
  - I can think about and show numbers in many ways.
  - I can identify the things that can be counted in a problem.
  - I can think about what the numbers in a problem mean and how to use them to solve

the problem.
- I can make connections between real-world situations and objects, diagrams, numbers, expressions, or equations.

MP3 I Can Construct Viable Arguments and Critique the Reasoning of Others
- I can explain or show my reasoning in a way that makes sense to others.
- I can listen to and read the work of others and offer feedback to help clarify or improve the work.
- I can come up with an idea and explain whether that idea is true.

MP4 I Can Model with Mathematics
- I can wonder about what mathematics is involved in a situation.
- I can come up with mathematical questions that can be asked about a situation.
- I can identify what questions can be answered based on data I have.
- I can identify information I need to know and don't need to know to answer a question.
- I can collect data or explain how it could be collected.
- I can model a situation using a representation such as a drawing, equation, line plot, picture graph, bar graph, or a building made of blocks.
- I can think about the real-world implications of my model.

MP5 I Can Use Appropriate Tools Strategically
- I can choose a tool that will help me make sense of a problem. These tools might include counters, base-ten blocks, tiles, a protractor, ruler, patty paper, graph, table, or external resources.
- I can use tools to help explain my thinking.
- I know how to use a variety of math tools to solve a problem.

MP6 I Can Attend to Precision
- I can use units or labels appropriately.
- I can communicate my reasoning using mathematical vocabulary and symbols.
- I can explain carefully so that others understand my thinking.
- I can decide if an answer makes sense for a problem.

MP7 I Can Look for and Make Use of Structure
- I can identify connections between problems I have already solved and new problems.
- I can compose and decompose numbers, expressions, and figures to make sense of the parts and of the whole.
- I can make connections between multiple mathematical representations.
- I can make use of patterns to help me solve a problem.

MP8 I Can Look for and Express Regularity in Repeated Reasoning
- I can identify and describe patterns and things that repeat.
- I can notice what changes and what stays the same when working with shapes, diagrams, or finding the value of expressions.
- I can use patterns to come up with a general rule.

- The **Center Overview** identifies the learning centers to be used in the unit. Each center has different stages, or levels. Students will progress through the stages as they master the objectives for each stage. Each center description includes the Common Core Standards that apply to that stage of the center, a stage narrative describing the activity with possible variations, and a list of materials needed for the center.

  - Each unit contains between 8 - 25 **Lesson Plans**.

Each lesson is designed to use 60 minutes. A typical lesson is divided into four phases; a warm-up activity, one or more instructional activities, the lesson synthesis, and a cool-down activity. Every activity within these phases is divided into three parts—the Launch, the Activity, and the Synthesis.

- **Warm-up Activity**—The warm-up activity is designed to strengthen the idea of mathematical community. In these activities, students work with their peers. Students use their personal experiences and mathematical knowledge to develop ideas, ask questions, defend their responses, and evaluate the reasoning of others. A warm-up activity might review a context students have seen before, have them reflect on where the previous lesson left off, or preview a context or idea that will come up in that lesson.

  There are several **warm-up routines** that are used during the lessons.

  - Act It Out—This routine is for kindergarten and first grade students. It encourages young children to understand the relationship between words and numbers. It provides opportunities for students to make sense of story problems. In this routine, students listen to a story problem and act it out through movement, using their fingers, or objects to represent the action in the story.

  - Choral Count—This routine encourages students to make predictions and think about patterns. It also provides opportunities for students to justify their reasoning. In this routine, students count aloud starting from a given number. The count might be forwards or backwards. The teacher records the numbers on a chart as students say them. Students then stop and look at the written numbers to make predictions and look for patterns.

  - Estimation Exploration—Estimation Exploration encourages students to use what they know and what they can see to problem-solve for a rough evaluation of a quantity rather than giving a “wild guess.” The estimates can be in the context of measurement, computation, or numerosity—estimating about a large group of objects (MP2). In this routine, students make estimates in response to a question about an image. They first think about estimates that would be sensible, but too high or too low. Then they make a reasonable estimate and discuss why their estimate makes sense.

  - How Many Do You See?—This routine encourages students to see groups when counting. Being able to see groups of objects in an organized way helps them visualize quantities and improves their ability to do mental computation. In this routine, students look at an image, which is typically an arrangement of dots or other shapes. Then students state how many dots or shapes they see. Also included in the discussion will be comments about the way they saw them or determined how many there were. This encourages students to see groups and patterns rather than count each item one by one.

  - Notice and Wonder—This routine provides an opportunity for students to bring their understandings and experiences to a problem. They share their ideas and ask questions without any pressure to answer or solve a problem. This routine reinforces the importance of making sense of situations before solving a problem. In this routine, students look at an image related to the topic of the lesson and are asked, “What do you notice?” The teacher writes all comments on a chart. They are then asked, “What do you wonder?”, and their questions are also recorded on the chart.

  - Number Talk—This routine provides an opportunity for students to practice

mental math. It helps them solve problems and think about numbers in flexible ways. They not only justify their own reasoning, but critique the reasoning of others as they make sense of methods for solving problems. In this routine, a series of problems are presented one at a time. Students solve the problem in their head and signal when they have an answer. The teacher takes notes as they justify their answer and explain their method for solving.

- Questions About Us—This routine is used with kindergarten students. It provides them opportunities to learn more about their classmates and gives them practice asking questions, organizing quantities, counting, and analyzing data. In this routine, students ask their classmates a question with two choices. They keep track of the answers and count the responses. The teacher then asks follow up questions that students answer using the data that they collected.

- True or False?—This routine encourages students to make sense of equations, often without any computation. It provides another opportunity for students to justify their reasoning as they explain to others what they are thinking. In this routine, students are presented with a series of equations, one at a time. Some equations may be true, and some may be false. Students use what they know about place value, operations, and number relationships to decide if each is true or false. And then, students explain how they know.

- What Do You Know About _____?—This routine encourages students to share their experiences and understandings about a math topic. In this routine, students are presented with a number, expression, or are asked a general question about a math topic. They then list everything they know about that topic. The teacher writes what students say and then references the list later so that students can add more ideas.

- Which One Doesn't Belong?—This routine provides an opportunity for students to reason about characteristics of shapes, math tools, or other images to decide which one doesn't belong. Because any answer is correct, students are able to focus on communicating their reasoning and justifying their choice. In this routine, students are shown 4 different images, which may be numbers, equations, shapes, images, or diagrams. They decide which one doesn't belong and explain why.

- **Instructional Activities**—After the warm-up, lessons consist of one to three instructional activities.

  Instructional Activities include:

  - 5 Practices—Lessons that include this routine are designed to allow students to solve problems in ways that make sense to them. During the activity, students engage in a problem in meaningful ways and teachers monitor to uncover and nurture conceptual understandings. During the activity synthesis, students collectively reveal multiple approaches to a problem and make connections between these approaches (MP3).

  - Card Sort—A card sorting task gives students opportunities to analyze representations, statements, and structures closely, and make connections (MP2 and MP7). As students work, teachers monitor for the different ways groups choose their categories, and encourage increasingly precise mathematical language (MP6).

  - MLR1 Stronger and Clearer Each *(MLR stands for Mathematics Learning Routine.)*—

Provides students with a structured and interactive opportunity to revise and refine both their ideas and their verbal and written output. *Embedded in grades 3–5.*

- MLR2 Collect and Display—Captures a variety of students' oral words and phrases into a stable, collective reference. Output can be organized, re-voiced, or explicitly connected to other languages in a display that all students can refer to, build on, or make connections with during future discussion or writing. *Embedded in grades K–5.*

- MLR3 Clarify, Critique, Correct—Gives students a piece of mathematical writing that is not their own to analyze, reflect on, and develop. *Embedded in grades 3–5.*

- MLR4 Information Gap—Creates an authentic need for students to communicate. Partners or team members are given different pieces of necessary information that must be used together to solve a problem. *Embedded in grades 3–5.*

- MLR5 Co-craft Questions—Allows students to get inside a context before feeling pressure to produce answers, and creates opportunities for students to produce the language of mathematical questions. *Embedded in grades 2–5.*

- MLR6 Three Reads—Supports reading comprehension, sense-making, and meta-awareness of mathematical language. Students take time to understand mathematical situations and story problems, and plan their strategies before finding solutions. *Embedded in grades K–5.*

- MLR7 Compare and Connect—Fosters students' meta-awareness as they identify, compare, and contrast different mathematical approaches, representations, and language. *Embedded in grades K–5.*

- MLR8 Discussion Supports—Includes a large variety of teacher moves that support rich discussions about mathematical ideas, representations, contexts, and strategies. *Embedded in grades K–2.*

- **Lesson Synthesis—**After the instructional activities are completed, students take time to reflect on the knowledge they have gained during the instructional activities and incorporate his with their previous knowledge. The lesson synthesis activity should take 5–10 minutes. During this time, teachers help students with this process by asking questions verbally and having students respond orally or in a written journal, by asking students to add on to a graphic organizer or concept map, or some similar activity.

- **Cool-down Activity—**The cool-down activity is given to students at the end of the lesson. This activity should take about 5 minutes. Students work on the cool-down independently and turn it in. The teacher uses the cool-down as a formative assessment to determine if students understand the lesson and to adjust further instruction.
  Note: The Cool-down activity is identified in the introduction to the lesson plan and not at the end of the lesson.

- **Assessments**—There are several opportunities for assessment during each unit.

  - Pre-unit problems can be used as a pre-unit assessment.

  - Each instructional task includes expected student responses and suggestions to advance student thinking. Teachers will adjust their instruction depending on how the students respond to the task. Frequently there are suggested questions to help teachers better understand students' thinking.

  - Practice problems are provided for each lesson that can be used for in-class practice, homework, or as a means to assess certain learning on a particular concept.

- Each section in second grade has a checklist to indicate that students are meeting the section goals.

- Each unit includes an end-of-unit written assessment that is intended for students to complete individually to assess what they have learned at the conclusion of the unit.

Unit Resources

Teacher Components

Teacher Guide: The Teacher Guide for each unit contains an overview of the sections in which the unit is divided, a description of the centers students will use with the unit, detailed lesson plans, and teacher resources. Within the overview of the unit sections can be found suggested activities from each unit section that can be used as a PLC activity for teachers. PLCs, or Professional Learning Communities, provide teachers the ability to work collaboratively in recurring cycles of collective inquiry and action research to achieve better results for students. PLCs give teachers the opportunity to discuss and plan instruction with peers.

The first few pages of each detailed lesson plan are directed to the teacher. Support notes to the teacher are in gray boxes throughout the lesson plan. On these first pages can be found:

- Alignment to the Common Core Standards
- Learning Goals
  - Teacher-facing learning goals appear at the top of lesson plans. They are directed to the teacher and describe the mathematical and pedagogical goals of the lesson.
  - Student-facing learning goals are directed to the student and start with the word "Let's." These learning goals can be written on the board before class begins. They are used to invite students into the work of that day without giving away too much and spoiling the problem-based instruction.
- Lesson Purpose
- Suggestions for instruction for English Learners and Students with Disabilities
- Instructional Routines
- List of materials needed for the lesson
- Lesson Timeline
- Description of the Cool-Down Activity
- Teacher Reflection Question – The purpose of this question is to provide a direction to the teachers to think critically about their teaching during the lesson.
- Sample Student Responses

At the back of the Teacher Guide are Teacher Resources for the unit.

- Family Support Materials
- Assessments
- Cool Downs
- Instructional Masters

Student Component

Activity Book: The Activity Book is used by the students during the lessons. It coordinates with the lesson plans. It displays the student-facing learning goals for each lesson as well as activity sheets for some activities. Not all activities will use the Activity Book.

As you will note when you examine the Activity Book, minimal text is included on each page. Instead, colorful photos and engaging illustrations dominate the Activity Book pages. The design of the Activity Book in this way is intentional because students in Kindergarten–Grade 2 are just learning to read. At these grade levels, students are learning how to decode written words, so the complexity and amount of text that these young students can actually read is quite limited.

While some advanced students may be able to read words on a given page of the Activity Book, as a general rule students should not be expected or asked to read aloud the text on the Activity Book pages. The text in the Activity Book is there so that teachers and parents can read it when sharing the Activity Book with students.

Introduction to Grade 2

The big ideas in grade 2 include: extending understanding of the base-ten number system, building fluency with addition and subtraction, using standard units of measure, and describing and analyzing shapes.

Grade 2 is divided into nine units:

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

Unit 1: Adding, Subtracting, and Working with Data

At a Glance

Unit 1 is estimated to be completed in 16-20 days including 2 days for assessment.

This unit is divided into three sections including 14 lessons and 4 optional lessons.

- Section A—Add and Subtract Within 20 (Lessons 1-6)
- Section B—Ways to Represent Data (Lessons 7-12)
- Section C—Diagrams to Compare (Lessons 13-18)

On pages 7-8 of this Teacher Guide is a chart that identifies the section each lesson belongs in and the materials needed for each lesson.

This unit uses six student centers.

- Number Puzzles: Addition and Subtraction
- What's Behind My Back
- How Close?
- Sort and Display
- Shake and Spill
- Counting Collections

Unit 1: Adding, Subtracting, and Working with Data

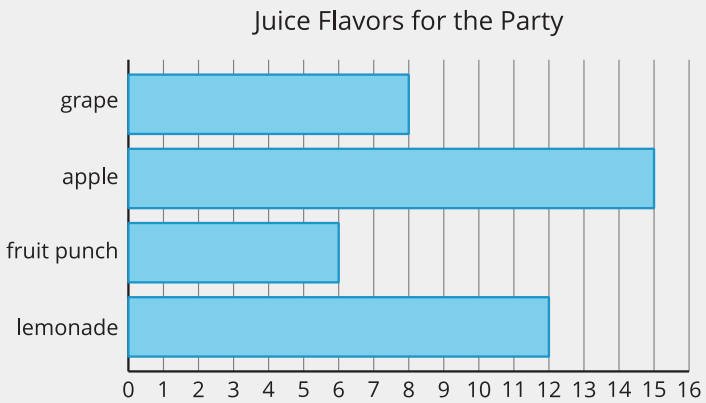
Unit Learning Goals

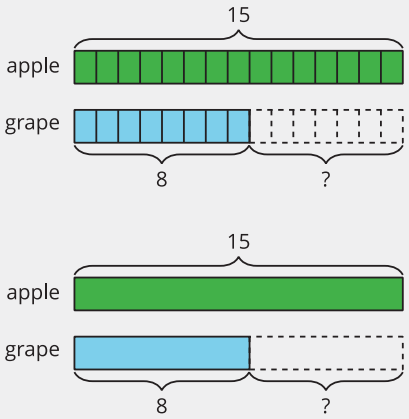
- Students represent and solve story problems within 20 through the context of picture and bar graphs that represent categorical data. Students build toward fluency with addition and subtraction.

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.

Here, 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

Standards Alignments

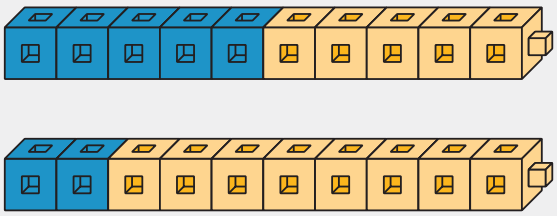
Building On	1.NBT.C.4, 1.OA.A.1, 1.OA.C.6
Addressing	2.NBT.B.5, 2.OA.B.2
Building Towards	2.OA.B.2

Section Learning Goals

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

This opening section gives teachers opportunities to assess students' fluency with addition and subtraction facts within 10 and how they 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.



$10 - 5 =$ _____

$5 +$ _____ $= 10$

$2 +$ _____ $= 10$

$10 - 8 =$ _____

Some activities take place in centers, enabling teachers to also introduce routines and structures while helping students develop mental strategies for adding and subtracting.

PLC: Lesson 2, Activity 2, Sums of 10

Suggested Centers

- Number Puzzles: Addition and Subtraction (1–4), Stage 1: Within 10 (Supporting)

Section B: Ways to Represent Data

Standards Alignments

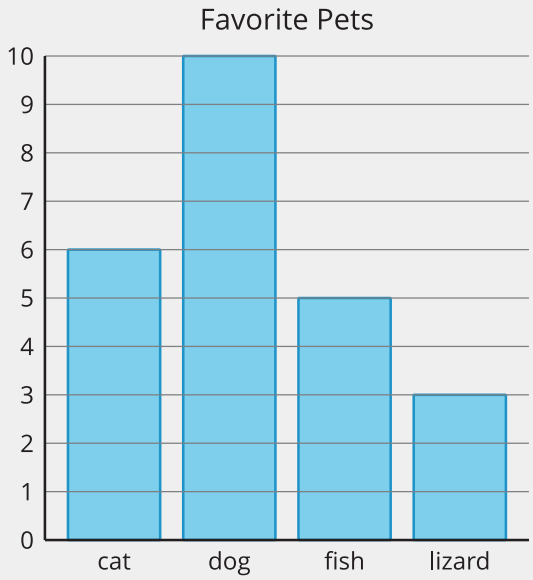
Building On	1.MD.C.4, 1.OA.C.5, 1.OA.C.6, 2.MD.D.10
Addressing	2.MD.D.10, 2.NBT.B.5, 2.OA.B.2
Building Towards	2.MD.D.10

Section Learning Goals

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

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.



PLC: Lesson 9, Activity 1, Field Trip Choices

Suggested Centers

- How Close? (1–5), Stage 3: Add to 100 (Addressing)
- Sort and Display (1–3), Stage 1: Any Way (Supporting)
- Shake and Spill (K–2), Stage 5: Cover (up to 20) (Addressing)

Section C: Diagrams to Compare

Standards Alignments

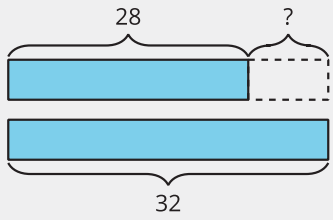
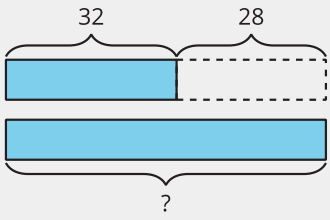
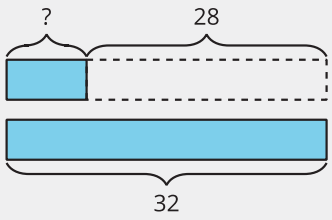
Addressing	2.MD.D.10, 2.NBT.A.2, 2.NBT.B.5, 2.OA.A.1, 2.OA.B.2
Building Towards	2.OA.A.1

Section Learning Goals

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

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, or an unknown smaller number. Tape diagrams help students to visualize these structures and support them in reasoning about strategies to use to solve problems, such as counting on or counting back. The table highlights the different types of problems in this section.

difference unknown	bigger unknown	smaller unknown
Lin counted 28 boats. Diego counted 32 boats. How many more boats did Diego count?	Lin found 28 more shells than Diego. Diego found 32 shells. How many shells did Lin find?	Lin saw 32 starfish. Diego saw 28 fewer starfish than Lin. How many starfish did Diego see?
		

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.

PLC: Lesson 14, Activity 1, Party Time (Part 1)

Suggested Centers

- Sort and Display (1–3), Stage 2: Picture or Bar Graphs (Addressing)
- Shake and Spill (K–2), Stage 5: Cover (up to 20) (Supporting)
- Number Puzzles: Addition and Subtraction (1–4), Stage 2: Within 20 (Addressing)

Throughout the Unit

The lessons in the first section and the warm-up activities throughout the unit allow students to build on addition and subtraction within 10 fluency from grade 1 and prepare for the end-of-grade-2 fluency with addition and subtraction within 20. Number Talks are used to help further develop fact fluency and mental math strategies. As the unit progresses, students use strategies to add two-digit and single-digit numbers and 2 two-digit numbers. In lessons 10 and 15, students can use mental strategies that involve composition and decomposition of numbers to create an equivalent expression to find the sum.

Here is a sampling of Number Talk warm-ups in the unit.

lesson 3	lesson 4	lesson 5	lesson 6	lesson 11	lesson 15
$7 + 3$	$8 + 2$	$16 + 3$	$14 + 22$	$3 + 7$	$4 + 8 + 2$
$10 - 7$	$8 + 3$	$16 + 5$	$19 + 22$	$3 + 7 + 2$	$4 + 5 + 3 + 2$
$10 - 2$	$8 + 5$	$26 + 5$	$15 + 25$	$5 + 7$	$9 + 3 + 1$
$10 - 4$	$7 + 6$	$38 + 6$	$17 + 25$	$2 + 4 + 8$	$9 + 5$

Materials Needed

LESSON	GATHER	COPY
A.1	• Connecting cubes or counters	• Number Cards (0-10) (groups of 2)
A.2	• Connecting cubes	• What's Behind My Back Stage 2 Recording Sheet Grade 1 (groups of 1)
A.3	• Connecting cubes	• What's Behind My Back Stage 3 Recording Sheet (groups of 1)
A.4	• Connecting cubes • Number cards 0–10	• How Close? Stage 1 Recording Sheet (groups of 1)
A.5	• Connecting cubes • Number cards 0–10	• How Close? Stage 3 Recording Sheet (groups of 1)
A.6	• Number cards 0–10	• Number Puzzles Addition and Subtraction Stage 2 Gameboard (groups of 1) • Number Puzzles Digit Cards (groups of 2)
B.7	• Chart paper • Glue • Markers • Materials from a previous activity • Scissors • Stickers • Tape	• How We Get to School (groups of 1)
B.8	• none	• none
B.9	• none	• none
B.10	• Materials from a previous activity	• Data Tables (groups of 6) • Picture and Bar Graph Template (groups of 1)

B.11	• Materials from a previous lesson	• none
B.12	• Collections of objects	• Sort and Display Stage 2 Recording Sheet (groups of 1)
C.13	• none	• none
C.14	• Glue or tape • Scissors	• Party Time (groups of 1)
C.15	• none	• Card Sort: At the Beach (groups of 2)
C.16	• none	• none
C.17	• Counting collections • Materials from previous centers	• 10-Frame Standard (groups of 1) • Counting Collections Stage 3 Recording Sheet (groups of 1)
C.18	• Colored pencils	• Picture and Bar Graph Template (groups of 1)

Center: Number Puzzles: Addition and Subtraction (1–4)

Stage 1: Within 10

Lessons

- Grade2.1.A1 (supporting)
- Grade2.1.A2 (supporting)
- Grade2.1.A3 (supporting)
- Grade2.1.A4 (supporting)
- Grade2.1.A5 (supporting)

Activities

- Grade2.1.A6.2 (addressing)
- Grade2.1.B12.2 (addressing)
- Grade2.1.C17.2 (addressing)

Stage Narrative

Students work together to use digit cards to make addition and subtraction equations within 10 true. Each digit card may only be used one time on a page.

Standards Alignments

Addressing 1.OA.D.8

Materials to Copy

Number Puzzles Addition and Subtraction Stage 1 Gameboard (groups of 2), Number Puzzles Digit Cards (groups of 2)

Stage 2: Within 20

Lessons

- Grade2.1.C15 (addressing)
- Grade2.1.C16 (addressing)

Activities

- Grade2.1.A6.1 (addressing)
- Grade2.1.A6.2 (addressing)
- Grade2.1.B12.2 (addressing)
- Grade2.1.C17.2 (addressing)

Stage Narrative

Students work together to use digit cards to make addition and subtraction equations within 20 true. Each digit card may only be used one time on a page.

Standards Alignments

Addressing 1.OA.C.6, 1.OA.D.8, 2.OA.B.2

Materials to Copy

Number Puzzles Addition and Subtraction Stage 2 Gameboard (groups of 1), Number Puzzles Digit Cards (groups of 2)

Stages used in Grade 1

Stage 1

Addressing

- Grade1.2.D
- Grade1.3.C

Supporting

- Grade1.3.A
- Grade1.3.B
- Grade1.4.A
- Grade1.4.B
- Grade1.5.A
- Grade1.5.B
- Grade1.5.C

Stage 2

Addressing

- Grade1.3.B
- Grade1.3.C

Supporting

- Grade1.4.A
- Grade1.4.B
- Grade1.5.A
- Grade1.5.B
- Grade1.5.C

Stage 3

Addressing

- Grade1.5.A
- Grade1.5.B
- Grade1.5.C

Stage 4

Addressing

- Grade1.5.C

Center: What’s Behind My Back (K–2)

Stage 2: 10 cubes

Activities

- Grade2.1.A2.1 (addressing)
- Grade2.1.A6.2 (addressing)
- Grade2.1.B12.2 (addressing)
- Grade2.1.C17.2 (addressing)

Stage Narrative

Students work with 10 cubes. One partner snaps the tower and puts one part behind their back and shows the other part to their partner. Their partner figures out how many cubes are behind their back.

This stage has two different recording sheets, one for kindergarten and another for grade 1. Be sure to use the appropriate recording sheet with students.

On the kindergarten recording sheet, students draw or color the connecting cube tower to show the two parts that the tower broke into and fill in an equation to show the total number of connecting cubes in the tower and the two parts that the tower was broken into.

On the grade 1 recording sheet, students record an addition equation with a blank to represent the missing cubes.

Standards Alignments

Addressing 1.OA.B.4, 1.OA.C.6, K.OA.A.4

Materials to Gather

10-frames, Connecting cubes

Materials to Copy

What's Behind My Back Stage 2 Recording Sheet Grade 1 (groups of 1), What's Behind My Back Stage 2 Recording Sheet Kindergarten (groups of 1)

Additional Information

Each group of 2 needs 10 connecting cubes.

Stage 3: 20 Cubes

Activities

- Grade2.1.A3.1 (addressing)
- Grade2.1.A6.2 (addressing)
- Grade2.1.B12.2 (addressing)
- Grade2.1.C17.2 (addressing)

Stage Narrative

Students work with 20 cubes, organized into two towers of 10 cubes. One partner snaps the towers and puts one part behind their back and shows the other part to their partner. Their partner figures out how many cubes are behind their back. Students record an addition equation with a blank to represent the missing cubes.

Standards Alignments

Addressing 2.OA.B.2

Materials to Gather

Connecting cubes

Materials to Copy

What's Behind My Back Stage 3 Recording Sheet (groups of 1)

Additional Information

Each group of 2 needs 20 connecting cubes.

Stages used in Grade 1

Stage 2

Addressing

- Grade1.1.B
- Grade1.1.C

Supporting

- Grade1.2.A
- Grade1.2.B
- Grade1.2.C
- Grade1.2.D

Center: How Close? (1–5)

Stage 1: Add to 20

Activities

- Grade2.1.A4.1 (addressing)
- Grade2.1.A6.2 (addressing)
- Grade2.1.B12.2 (addressing)
- Grade2.1.C17.2 (addressing)

Stage Narrative

Before playing, students remove the cards that show 10 and set them aside.

Each student picks 5 cards and chooses 3 of them to write an addition expression with 3 addends. The student whose sum is closest to 20 wins a point for the round. Students pick new cards so that they have 5 cards in their hand and then start the next round.

Standards Alignments

Addressing 1.OA.C.6, 2.OA.B.2

Materials to Gather

Number cards 0–10

Materials to Copy

How Close? Stage 1 Recording Sheet (groups of 1)

Stage 2: Subtract from 20

Activities

- Grade2.1.A5.1 (addressing)
- Grade2.1.A6.2 (addressing)
- Grade2.1.B12.2 (addressing)
- Grade2.1.C17.2 (addressing)

Stage Narrative

Before playing, students remove the cards that show the number 10 and set them aside.

Each student picks 4 cards and chooses 2 or 3 to subtract from 20 to get close to 0. The student whose difference is closest to 0 wins a point for the round. Students pick new cards so that they have 4 cards in their hand and then start the next round.

Standards Alignments

Addressing 1.OA.C.6, 2.OA.B.2

Materials to Gather

Number cards 0–10

Materials to Copy

How Close? Stage 2 Recording Sheet (groups of 1)

Stage 3: Add to 100

Lessons

- Grade2.1.B7 (addressing)
- Grade2.1.B8 (addressing)
- Grade2.1.B9 (addressing)

Activities

- Grade2.1.A5.1 (addressing)
- Grade2.1.A6.2 (addressing)
- Grade2.1.B12.2 (addressing)
- Grade2.1.C17.2 (addressing)

Stage Narrative

Before playing, students remove the cards that show the number 10 and set them aside.

Each student picks 7 cards and chooses 4 of them to create 2 two-digit numbers. Each student adds the numbers and the student whose sum is closest to 100 wins a point for the round. Students pick new cards so that they have 7 cards in their hand and then start the next round.

Standards Alignments

Addressing 1.NBT.C.4, 2.NBT.B.5

Materials to Gather

Number cards 0–10

Materials to Copy

How Close? Stage 3 Recording Sheet (groups of 1)

Stages used in Grade 1

Stage 1

Addressing

- Grade1.3.C
- Grade1.3.D

Supporting

- Grade1.4.A
- Grade1.4.B
- Grade1.6.B
- Grade1.7.A

Stage 2

Addressing

- Grade1.3.D

Supporting

- Grade1.4.A
- Grade1.4.B
- Grade1.6.B
- Grade1.7.A

Stage 3

Addressing

- Grade1.6.A
- Grade1.6.B

Supporting

- Grade1.7.A

Center: Sort and Display (1–3)

Stage 1: Any Way

Lessons

- Grade2.1.B7 (supporting)
- Grade2.1.B8 (supporting)
- Grade2.1.B9 (supporting)
- Grade2.1.B10 (supporting)
- Grade2.1.B11 (supporting)

Stage Narrative

Students sort 10–20 objects into two or three categories and then show how they sorted. Provide students with a group of items that will be interesting for them to work with such as:

- pattern blocks
- connecting cubes
- counters
- combination of the blocks, cubes, and counters
- sets of books

Students then show their representation to a partner and ask questions that can be answered about their collection of objects.

Standards Alignments

Addressing 1.MD.C.4

Materials to Gather

Collections of objects

Materials to Copy

Sort and Display Stage 1 Recording Sheet (groups of 1)

Additional Information

Create collections of 10–20 objects with up to three attributes by which to sort.

Stage 2: Picture or Bar Graphs

Lessons

- Grade2.1.C13 (addressing)
- Grade2.1.C14 (addressing)
- Grade2.1.C15 (addressing)
- Grade2.1.C16 (addressing)

Activities

- Grade2.1.B12.1 (addressing)
- Grade2.1.C17.2 (addressing)

Stage Narrative

Students sort 20–30 objects into three categories and make a picture or bar graph that shows how they sorted. Provide students with a group of items that will be interesting for them to work with such as:

- pattern blocks
- connecting cubes
- counters
- combination of the blocks, cubes, and counters
- sets of books

Students then ask their partner two questions that can be answered based on their graph.

Standards Alignments

Addressing 2.MD.D.10

Materials to Gather

Collections of objects

Materials to Copy

Sort and Display Stage 2 Recording Sheet (groups of 1)

Additional Information

Create collections of 20–30 objects with up to three attributes by which to sort.

Stages used in Grade 1

Stage 1

Addressing

- Grade1.1.C

Supporting

- Grade1.2.A

Center: Shake and Spill (K–2)

Stage 5: Cover (up to 20)

Lessons

- Grade2.1.B10 (addressing)
- Grade2.1.B11 (addressing)
- Grade2.1.C13 (supporting)
- Grade2.1.C14 (supporting)
- Grade2.1.C15 (supporting)
- Grade2.1.C16 (supporting)

Stage Narrative

Students decide together how many counters, between 11–20, to use. Partner A closes their eyes while Partner B shakes, spills, and covers up the yellow counters with a cup. Partner A determines how many counters are under the cup and explains how they know. Both partners record the round. Switch roles and repeat.

Standards Alignments

Addressing 1.OA.C.6, 2.OA.B.2

Materials to Gather

Cups, Two-color counters

Materials to Copy

Shake and Spill Stage 4 and 5 Recording Sheet (G1 and 2) (groups of 1)

Additional Information

Each group of 2 needs a cup and 20 two-color counters.

Stages used in Grade 1

Stage 3

Supporting

- Grade1.2.B
- Grade1.2.C
- Grade1.2.D
- Grade1.3.A
- Grade1.3.B
- Grade1.3.C
- Grade1.4.B

Stage 4

Addressing

- Grade1.2.B
- Grade1.2.C
- Grade1.2.D

Supporting

- Grade1.3.B
- Grade1.3.C
- Grade1.4.B

Stage 5

Addressing

- Grade1.3.B
- Grade1.3.C

Supporting

- Grade1.4.B

Center: Counting Collections (K–1)

Stage 3: Estimate and Count Up to 120

Activities

- Grade2.1.C17.1 (addressing)

Stage Narrative

Students are given a collection of up to 120 objects. They record an estimate for how many objects they think are in their collection. Then, they work with a partner to figure out how many objects are in their collection and each partner records how many. Students may draw pictures, write numbers or equations, or use base-ten representations to represent their collection.

Standards Alignments

Addressing 1.NBT.A.1

Materials to Gather

10-frames, Collections of objects, Cups, Paper plates

Materials to Copy

Counting Collections Stage 3 Recording Sheet (groups of 1)

Additional Information

Create a collection of up to 120 objects per group of 2 students (buttons, two-color counters, linking cubes, paper clips, pattern blocks, square tiles, paper placemats).

Stages used in Grade 1

Stage 1

Supporting

- Grade1.1.A
- Grade1.1.B

Stage 3

Addressing

- Grade1.6.C

Section A: Add and Subtract Within 20

Lesson 1: Add and Subtract Within 10

Standards Alignments

Building On	1.OA.C.6
Addressing	2.OA.B.2
Building Towards	2.OA.B.2

Teacher-facing Learning Goals

- Add and subtract within 10.

Student-facing Learning Goals

- Let's add and subtract within 10.

Lesson Purpose

The purpose of this lesson is for students to add and subtract within 10.

Students develop fluency with addition and subtraction within 10 in grade 1. This lesson provides an opportunity for formative assessment of students' fluency within 10, including recognizing sums with a value of 10. Throughout the lesson, monitor for the ways students find the values of sums and differences and how they describe their methods to others. There may be sums and differences students say they "just know." In this case, do not require students to explain how they got their answer every time, and take note of the expressions that many students already know from memory. Counters or connecting cubes should be made available for students to use, however encourage students not to use them if they don't need them.

Math Community

In the lesson synthesis, students discuss what it means to be a part of a mathematical community. Prepare a space, such as a piece of poster paper, titled "Math Community" and a T-chart with the header "Doing Math" and "Norms". Partition the columns into two sections: students and teacher. The two sections encourage the students and teacher to be mindful that both respective parties are responsible for the way math is being done in the classroom. In the synthesis of this lesson, students will add their ideas to the "Doing Math" section. In upcoming lessons, students will add to and revise their contributions, including drafting classroom norms.

Mathematical Community	
Doing Math	*Norms*
Students	Students
Teacher	Teacher

Access for:

Students with Disabilities

- Representation (Activity 1)

English Learners

- MLR8 (Activity 1)

Instructional Routines

What Do You Know About _____? (Warm-up)

Materials to Gather

- Connecting cubes or counters: Activity 1, Activity 2

Materials to Copy

- Number Cards (0-10) (groups of 2): Activity 1

Lesson Timeline

Warm-up	15 min
Activity 1	20 min
Activity 2	10 min
Lesson Synthesis	10 min
Cool-down	5 min

Teacher Reflection Question

What do you love most about math? How are you sharing that joy with your students and encouraging them to think about what they love about math?

Cool-down (to be completed at the end of the lesson)

5 min

Sums and Differences

Standards Alignments

Addressing 2.OA.B.2

Student-facing Task Statement

1. $4 + 2 =$ _____
2. $9 - 3 =$ _____
3. Circle the expressions that have a value of 10.

$4 + 6$ $2 + 7$ $8 + 1$ $5 + 5$ $7 + 3$

Student Responses

1. 6
2. 6
3. Circles $4 + 6$, $5 + 5$, and $7 + 3$.

Begin Lesson

Warm-up

15 min

What Do You Know About Math?

Standards Alignments

Building Towards 2.OA.B.2

The purpose of this activity is to elicit ideas students have about doing math. Students learn the What Do You Know _____? routine which will be used throughout the year. This routine provides an opportunity for all students to contribute to the conversation and for the teacher to listen to what knowledge students already have. Since this is the first warm-up of the year, we allocated 15 minutes, instead of 10, to establish the structure of a routine.

For all of the routines, consider establishing a small, discreet hand signal that students can display to indicate they have an answer they can support with reasoning. This signal could be a thumbs-up, a certain number of fingers that tells the number of responses they have, or another subtle signal. This is a quick way to see if students have had enough time to think about the problem. It also keeps students from being distracted or rushed by hands being raised around the class.

Instructional Routines

What Do You Know About _____?

Student-facing Task Statement

What do you know about math?

Student Responses

Sample responses:

- Math uses numbers.
- You add and subtract in math.
- You work with shapes in math.
- Math is everywhere.

Launch

- Display the question.
- "What do you know about math?"
- 1 minute: quiet think time

Activity

- Record responses.

Synthesis

- "Today, you will get to do math in different ways."

Activity 1

20 min

Check It Off: Add or Subtract within 10

Standards Alignments

Building On	1.OA.C.6
Addressing	2.OA.B.2

The purpose of this activity is for students to demonstrate methods they have for addition and subtraction within 10. In this activity, students draw 2 cards and consider how they could add or subtract the numbers to create a value that matches one of the target numbers (0–10). Listen for the ways students think about how to find the value of sums and differences, including any sums

and differences they know from memory, and how they share their thinking with their partner. If students disagree about the value of a sum or difference, encourage them to discuss their reasoning and reach an agreement (MP3).

Students may write subtraction expressions that do not match their computation (for example, students write $2 - 4$ instead of $4 - 2$). Ask them to use counters or cubes to represent the subtraction. Highlight that they started with 4 and took away 2 and ask them to connect this action to the expression. To stay mathematically consistent with what students will learn in later grades about operations with rational numbers, avoid language that suggests students can only subtract a smaller number from a larger number.

Access for English Learners

MLR8 Discussion Supports. Provide all students with an opportunity for verbal output. Invite students to read each expression they create to their partner. Amplify words and phrases such as: add, addition, sum, take away, difference, value, and expression.
Advances: Speaking, Listening, Representing

Access for Students with Disabilities

Representation: Access for Perception. Some students may benefit from a demonstration of how to play the game using the available connecting cubes or counters.
Supports accessibility for: Conceptual Processing, Visual-Spatial Processing

Materials to Gather

Connecting cubes or counters

Materials to Copy

Number Cards (0-10) (groups of 2)

Required Preparation

- Create a set of number cards for each group of 2.
- The number cards will be used in upcoming lessons and thoughout the year. Consider copying the cards on cardstock or laminating them for future use.
- Create the math community poster for display in the lesson synthesis.

Student-facing Task Statement

1. Pick 2 cards and find the value of the sum or difference.
2. Check off the number you found and write the expression.
3. The person who checks off the most numbers wins.

Launch

- Groups of 2
- Give each group a set of number cards.
- Give students access to connecting cubes or counters.
- “We are going to play Check It Off: Add or

	Found it!	Expression
0		
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

Student Responses

Answers vary. Sample response:

	Found it!	Expression
0		
1	✓	$8 - 7$
2	✓	$10 - 8$
3		
4		
5	✓	$10 - 5$, $3 + 2$
6	✓	$4 + 2$
7	✓	$6 + 1$
8		
9	✓	$5 + 4$
10	✓	$10 - 0$

Subtract within 10. The goal is to be the first person to write an expression for each number."

- "I'm going to pick two cards. (Show 10 and 7.) I have to decide whether I want to add or subtract. I don't want a value greater than 10, so I'm going to subtract."
- Write $10 - 7$.
- "What is the value of the difference?"
- 30 seconds: quiet think time
- Share responses.
- "I record the expression I made on my recording sheet next to the value of the difference and check off the number. Now it's my partner's turn."
- "Take turns picking cards, making an addition or subtraction expression, finding the value of the sum or difference, and showing your partner how you know."
- "If you run out of cards before someone checks off all the numbers, shuffle them and start again."

Activity

- 10–15 minutes: partner work time

Synthesis

- "Did you write any expressions that matched the same value? What number was it? What were the expressions?"
- "Were there any values that you and your partner did not find? What are some expressions that could match these numbers?"
- If needed ask,
    - "What expressions did you get for 5?" (Answers will vary. Sample response: I found $10 - 5$ and $3 + 2$.)
    - "What expressions did you get for

0?" (Answers will vary. Sample response: I found $9 - 9$ and $0 + 0$.)

- "What expressions did you get for 10?" (Answers will vary. Sample response: I found $3 + 7$ and $10 + 0$.)

Activity 2

10 min

What's the Value?

Standards Alignments

Building On	1.OA.C.6
Addressing	2.OA.B.2

The purpose of the activity is for students to practice finding the value of sums and differences within 10. Students also identify addition expressions that have a value of 10. Students will work more with sums of 10 in the next lesson. This activity provides an opportunity to observe how students find sums and differences within 10, including those they know from memory.

Materials to Gather

Connecting cubes or counters

Student-facing Task Statement

1. Match each expression to the value of the sum or difference.

$5 + 3$	9
$3 - 1$	3
$10 - 1$	8
$4 + 5$	7
$6 + 3$	1
$6 - 5$	4
$1 + 6$	2

Launch

- Groups of 2
- Give students access to connecting cubes or counters.
- Read task statement.

Activity

- 6 minutes: independent work time
- "Share your thinking and your answers with a partner."
- 1 minute: partner discussion

- $9 - 5$
- $8 - 5$
- $3 + 6$

2. Circle all the addition expressions that have a value of 10.

0+0	0+1	0+2	0+3	0+4	0+5	0+6	0+7	0+8	0+9	0+10
1+0	1+1	1+2	1+3	1+4	1+5	1+6	1+7	1+8	1+9	
2+0	2+1	2+2	2+3	2+4	2+5	2+6	2+7	2+8		
3+0	3+1	3+2	3+3	3+4	3+5	3+6	3+7			
4+0	4+1	4+2	4+3	4+4	4+5	4+6				
5+0	5+1	5+2	5+3	5+4	5+5					
6+0	6+1	6+2	6+3	6+4						
7+0	7+1	7+2	7+3							
8+0	8+1	8+2								
9+0	9+1									
10+0										

3. What patterns do you see in the numbers in the expressions that have a value of 10?

Student Responses

1. Correctly matches each expression.
2. Circles $10 + 0$, $9 + 1$, $8 + 2$, $7 + 3$, $6 + 4$, $5 + 5$, $4 + 6$, $3 + 7$, $2 + 8$, $1 + 9$, and $0 + 10$
3. Sample responses:
   - When one of the numbers gets bigger, the other number gets smaller.
   - I see $3 + 7$ and $4 + 6$. The 3 changes to 4 by adding 1 so the other number needs to subtract 1 so it goes from 7 to 6.

Synthesis

- Ask students to share answers to problem 3.
- Record responses.

Lesson Synthesis

10 min

"Today, you played a math game and added and subtracted within 10. We are going to make a chart to describe what you do and I do in our mathematical community."

Display math community poster.

"What does it look and sound like to do math together as a mathematical community?" (We talked to each other and to the teacher. We had some quiet time to think. We shared our ideas. We thought about the math ideas and words we knew. You were writing down our answers. You were waiting until we gave the answers.)

Share and record responses.

Suggested Centers

- Number Puzzles: Addition and Subtraction (1–4), Stage 1: Within 10 (Supporting)

Complete Cool-Down

Response to Student Thinking

Students find some of the expressions that equal 10, but not all of them.

Next Day Support

- During the launch of the next day's activity, have students use 10 frames and two-color counters to show sums of 10.

The work in this lesson builds from the addition concepts developed in a prior unit.

Prior Unit Support

Grade 1, Unit 3, Section C: Add within 20

Lesson 2: Relate Addition and Subtraction within 10

Standards Alignments

Building On	1.OA.A.1
Addressing	2.OA.B.2
Building Towards	2.OA.B.2

Teacher-facing Learning Goals

- Find the number that makes equations within 20 true.
- Write equations with unknown addends and sums of 10 and their related subtraction equations.

Student-facing Learning Goals

- Let's think about the relationship between addition and subtraction.

Lesson Purpose

The purpose of this lesson is for students to find the number that makes equations true and write addition and related subtraction equations within 10.

In previous grades, students learned to find the number that makes 10 when added to a given number and to make a ten to add within 20 and 100. The ability to look for and use sums that have a value of 10 is a foundational skill for the grade 2 benchmark of fluency within 20 and for adding and subtracting within 1,000 using methods based on place value.

In this lesson, students revisit a center activity, What's Behind My Back, and use connecting cubes to elicit their understanding of sums that a value of 10 and the relationship between addition and subtraction. Students will continue practice recognizing and using these sums in lesson activities throughout the unit.

Math Community

Tell students they will have an opportunity to revise their math community ideas at the end of this lesson, so as they work today they should think about actions that may be missing from the current list.

Access for:

Students with Disabilities

- Action and Expression (Activity 2)

English Learners

- MLR8 (Activity 1)

Instructional Routines

What Do You Know About _____? (Warm-up)

Materials to Gather

- Connecting cubes: Activity 1

Materials to Copy

- What's Behind My Back Stage 2 Recording Sheet Grade 1 (groups of 1): Activity 1

Lesson Timeline

Warm-up	10 min
Activity 1	20 min
Activity 2	15 min
Lesson Synthesis	10 min
Cool-down	5 min

Teacher Reflection Question

How are you facilitating the creation of a productive mathematical community? Where can you point to evidence of this for students to see?

Cool-down (to be completed at the end of the lesson)

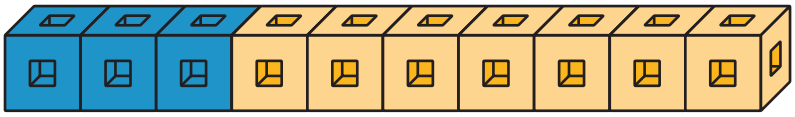
5 min

Represent the Cubes

Standards Alignments

Addressing 2.OA.B.2

Student-facing Task Statement



Circle the **2** equations that represent the cubes.

$7 + _____ = 10$

$10 + 3 = _____$

$3 + _____ = 7$

$10 - 3 =$ _____

Student Responses

Students circle $7 +$ ___ $= 10$ and $10 - 3 =$ ___ .

Begin Lesson

Warm-up

10 min

What Do You Know About 10?

Standards Alignments

Building Towards 2.OA.B.2

The purpose of this activity is to elicit ideas students have about the number 10. This routine provides an opportunity for all students to contribute to the conversation and for the teacher to listen to what knowledge students already have. When students share where they see 10 in the real-world, they show their ability to contextualize numbers (MP2). When students share about numbers that are close to 10 when counting, relate 10 ones to the unit ten, and sums and differences with the value of 10, they show what they know about the structure of whole numbers, place value, and the properties of operations (MP7).

Instructional Routines

What Do You Know About _____?

Student-facing Task Statement

What do you know about 10?

Student Responses

Sample responses:

- 10 is 5 and 5.
- There's 10 counters on a 10-frame.
- I have 10 fingers.

Launch

- Display the number.
- "What do you know about 10?"
- 1 minute: quiet think time

Activity

- Record responses.

- 10 is one more than 9.
- 10 is part of the teen numbers.

Synthesis

- If needed, “How could we represent the number 10?”

Activity 1

20 min

Revisit What’s Behind My Back, 10 Cubes

Standards Alignments

Building On	1.OA.A.1
Addressing	2.OA.B.2

The purpose of this activity is for students to revisit stage 2 of the What's Behind My Back center, which was first introduced in grade 1. Students begin with a tower of 10 connecting cubes. They break apart the tower and represent the two parts with a drawing and an expression. Throughout the activity, students practice using what they know about sums of 10 and the relationship between addition and subtraction to find unknown addends. Students explain their reasoning about how they know how many cubes are missing to their partner (MP3). As students discuss, listen for the ways students show how they are looking for and using the counting sequence, properties of operations, or the relationship between addition and subtraction (MP7).

Access for English Learners

MLR8 Discussion Supports. Make connections between representations visible. Think aloud, use gestures and a labeled display to show connections between parts of the equation and the cubes that are visible and those that are hidden.
Advances: Listening, Representing

Materials to Gather

Connecting cubes

Materials to Copy

What's Behind My Back Stage 2 Recording Sheet Grade 1 (groups of 1)

Required Preparation

- Gather a tower of 10 connecting cubes to use in the launch.

Launch

- Groups of 2
- Give each group 10 connecting cubes.
- "We are going to play a game you may have played in first grade called What's Behind My Back?"
- Show students a tower of 10 cubes. Put the tower behind your back. Break off 4 cubes, and display the rest of the tower.
- "How many cubes are behind my back? How do you know?" (4 because there are 6 and 4 more makes 10. I know because $10 - 4 = 6$.)
- 30 seconds: quiet think time
- 1 minute: partner discussion
- Share responses.
- "After one partner has hidden the cubes, switch roles."

Activity

- 10 minutes: partner work time

Synthesis

- Ask a student to play a round of the game with the class.
- As the student displays the tower, write the related addition equation with an unknown addend on the board. (for example, if a student shows 2 blocks, write $2 + ___ = 10$.)
- "How does this equation represent the game?"
- "What number makes the equation true?"
- "How can we represent the game with a subtraction equation?" ($10 - 2 = 8$ or $10 - 8 = 2$)
- If needed, ask students to show how the numbers in the addition and subtraction equations represent the cubes in the round.

Activity 2

15 min

Sums of 10

PLC Activity

Standards Alignments

Building On	1.OA.A.1
Addressing	2.OA.B.2

The purpose of the activity is for students to practice their fluency with sums of 10 as they find the numbers that make equations true. In this activity, students represent images of connecting cube towers with equations and match equations with an unknown number to these images (MP2). In the synthesis, students explain how their equations match the images (MP6).

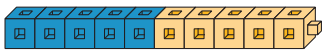
Access for Students with Disabilities

Action and Expression: Develop Expression and Communication. Give students access to a ten frame and connecting cubes or counters to recreate the equations.
Supports accessibility for: Organization, Conceptual Processing

Student-facing Task Statement

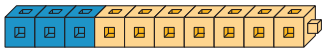
1. For each cube tower, write as many equations as you can think of that represent the cubes.

A



B

C



D

Launch

- Groups of 2
- “Look at cube tower A in your book.”
- “Write as many equations as you can think of that represent the tower.”
- 2 minutes: partner work time
- Share responses.

Activity

- “Continue writing equations for each cube tower. Write as many equations as you can think of for each tower. You can write addition and subtraction equations.”
- 5 minutes: partner work time
- “Now look at the equations in the table. Some of the equations might match the

E

2. Find the number that makes each equation true. Then write the letter of the cube tower that represents the equation.

$3 + ____ = 10$	Letter: ___
$10 - 7 = ____$	Letter: ___
$10 - 5 = ____$	Letter: ___
$2 + ____ = 10$	Letter: ___
$10 - 1 = ____$	Letter: ___
$10 - 2 = ____$	Letter: ___
$____ + 6 = 10$	Letter: ___
$____ + 9 = 10$	Letter: ___
$5 + ____ = 10$	Letter: ___
$10 - ____ = 4$	Letter: ___

Student Responses

$3 + \boxed{7} = 10$	Letter: **C**
$10 - 7 = \boxed{3}$	Letter: **C**
$10 - 5 = \boxed{5}$	Letter: **A**
$2 + \boxed{8} = 10$	Letter: **D**
$10 - 1 = \boxed{9}$	Letter: **E**
$10 - 2 = \boxed{8}$	Letter: **D**
$\boxed{4} + 6 = 10$	Letter: **B**
$\boxed{1} + 9 = 10$	Letter: **E**
$5 + \boxed{5} = 10$	Letter: **A**
$10 - \boxed{6} = 4$	Letter: **B**

equations you wrote under the cube towers."

- "Find the number that makes each equation true. Then write the letter of the cube tower that represents the equation."
- 5 minutes: partner work time

Synthesis

- Display $10 - 7 = ____$
- "Which cube tower does this equation represent?" (C)
- "Where do you see each part of the equation in the tower? (There are 10 cubes altogether. 7 cubes are yellow and the unknown number of cubes are blue.)
- "How can the tower help us find the unknown number?" (It helps you see there are 10 blocks and 7 yellow and 3 blue would make 10. If we take away the 7 yellow, we see the unknown number is 3.)

Lesson Synthesis

10 min

Math Community

"Let's revisit our Mathematical Community chart."

Display chart.

"Based on what we did today, what can we add to "Doing Math"?

Suggested Centers

- Number Puzzles: Addition and Subtraction (1–4), Stage 1: Within 10 (Supporting)

Complete Cool-Down

Response to Student Thinking

Students do not identify both equations that represent the cubes.

Next Day Support

- After the warm-up, ask students to connect the expressions in the Number Talk and their methods for finding the values to the image in this cool-down.

Lesson 3: Relate Addition and Subtraction within 20

Standards Alignments

Addressing 2.OA.B.2

Teacher-facing Learning Goals

- Find the number that makes equations within 20 true using the relationship between addition and subtraction.

Student-facing Learning Goals

- Let's find the number that makes equations with 20 true.

Lesson Purpose

The purpose of this lesson is for students to find the number that makes equations true within 20.

In this lesson, students apply the reasoning they used in previous lessons with addends that make 10 to find the number that makes an equations true that include the number 20. In the first activity, students learn stage 3 of the What's Behind My Back center in which they work with 20 cubes, organized into two towers of 10 cubes. In the second activity, students find the number that makes different equations with addition and subtraction expressions true. Throughout the lesson, students have opportunities to use what they know about the structure of whole numbers and the relationship of addition and subtraction to find the unknown numbers and explain their methods (MP3, MP7).

Math Community

In the lesson synthesis, students use their Mathematical Community Poster to create norms for the classroom.

Access for:

Students with Disabilities

- Representation (Activity 1)

English Learners

- MLR7 (Activity 1)

Instructional Routines

Number Talk (Warm-up)

Materials to Gather

- Connecting cubes: Activity 1, Activity 2

Materials to Copy

- What's Behind My Back Stage 3 Recording Sheet (groups of 1): Activity 1

Lesson Timeline

Warm-up	10 min
Activity 1	20 min
Activity 2	15 min
Lesson Synthesis	10 min
Cool-down	5 min

Teacher Reflection Question

What makes someone good at math? In what ways are you making assumptions about which of your students are good at math?

Cool-down (to be completed at the end of the lesson)

5 min

Which Equations Are True?

Standards Alignments

Addressing 2.OA.B.2

Student-facing Task Statement

Find the number that makes each equation true.

1. _____ $+ 17 = 20$
2. $20 - 9 =$ _____
3. _____ $+ 5 = 20$
4. $20 -$ _____ $= 8$

Student Responses

1. 3. Sample response: 18, 19, 20. I counted 3 more.
2. 11. Sample response: $9 + 1 = 10$, $10 + 10 = 20$, $10 + 1 = 11$
3. 15. Sample response: $5 + 5 = 10$, $10 + 10 = 20$, $10 + 5 = 15$
4. 12. Sample response: $8 + 2 = 10$, $10 + 10 = 20$, $10 + 2 = 12$

Begin Lesson

Warm-up

10 min

Number Talk: Addition and Subtraction

Standards Alignments

Addressing 2.OA.B.2

This Number Talk encourages students to think about the relationship between addition and subtraction to mentally solve problems. This builds on the work in the previous lesson where students used the relationship between addition and subtraction to find unknown numbers in equations. The understanding elicited here will be helpful later in the lesson when students find the value to make an equation true.

Instructional Routines

Number Talk

Student-facing Task Statement

Find the value of each expression mentally.

- $7 + 3$
- $10 - 7$
- $10 - 2$
- $10 - 4$

Student Responses

- 10: I know that fact.
- 3: if $7 + 3$ is 10, then $10 - 7$ is 3
- 8: I counted back 2
- 6: I know $6 + 4$ is 10

Launch

- Display one expression.
- "Give me a signal when you have an answer and can explain how you got it."
- 1 minute: quiet think time

Activity

- Record answers and strategy.
- Keep expressions and work displayed.
- Repeat with each expression.

Synthesis

- "How did thinking about addition help you subtract?" (I thought about what number I could add to the 4 to make 10. Since I know 4 + 6 = 10 then I knew 10 – 4 = 6)
- If needed, use connecting cubes to represent students' thinking.

Activity 1

20 min

Introduce What's Behind My Back, 20 Cubes

Standards Alignments

Addressing 2.OA.B.2

In this activity, students learn stage 3 of the What's Behind My Back center. In this new stage, called 20 cubes, students work with 20 cubes, organized into two towers of 10 cubes. One partner snaps the tower and puts one part behind their back and shows the other part to their partner. The other partner figures out how many cubes are behind their partner's back. Students record an addition equation with a blank to represent the missing cubes. Students may write equations with the blank as the first or second addend. Ask students to explain what each number and blank in the equation represents in the context of the center activity (MP2).

Access for English Learners

MLR7 Compare and Connect. Synthesis: Invite students to discuss connections between the different approaches. Ask, "What did these strategies have in common? How were they different?"
Advances: Representing, Conversing

Access for Students with Disabilities

Representation: Internalize Comprehension. Synthesis: Invite students to identify which details were important or most useful to pay attention to. Display the sentence frame, "To figure out how many cubes are behind my partner's back, I can . . . ."
Supports accessibility for: Visual-Spatial Processing

Materials to Gather

Connecting cubes

Materials to Copy

What's Behind My Back Stage 3 Recording Sheet (groups of 1)

Launch

- Groups of 2
- Give each group 20 connecting cubes and a recording sheet.
- "We are going to play What's Behind My Back,

this time with 20 cubes."

- "How did you figure out how many connecting cubes were behind your partner's back last time?" (I thought about an addition expression that would make 10. I subtracted what they showed me from 10.)
- "Let's play a round with 20."
- Show students 2 towers of 10 cubes. Put the towers behind your back. Break off and display 8 of the cubes.
- "This time when you play, you are going to record an addition equation with a blank to represent the missing cubes, before you figure out how many are behind your partner's back. What equation should we record?" ($8 + ___ = 20$)
- 30 seconds: quiet think time
- Share responses.
- "How many cubes are behind my back? How do you know?" (12 because 2 more makes 10 and then here's another tower of 10.)
- 30 seconds: quiet think time
- 30 seconds: partner discussion
- "Play with your partner. Don't forget to record an equation each round."

Activity

- 10 minutes: partner work time

Synthesis

- Display 9 cubes.
- "What's an addition equation I can write to represent the number of cubes you know and the number of cubes you need to figure out?" (9 + _____ = 20)
- "Tell your partner how you can figure out how many cubes are missing."
- Monitor for students who talk about making a 10 and knowing there is one more 10.

- Share responses.

Activity 2

15 min

Make the Equation True

Standards Alignments

Addressing 2.OA.B.2

The purpose of this activity is for students to find the value that makes an addition or subtraction equation true, with totals of 20. Students may use whatever method makes sense to them. In the launch, students work with a new partner and fill in the unknown addend in the equations on their recording sheet from Activity 1.

Materials to Gather

Connecting cubes

Student-facing Task Statement

Find the number that makes each equation true.

1. $4 + _____ = 20$
2. $20 - _____ = 4$
3. $6 + _____ = 20$
4. $20 - _____ = 10$
5. $_____ + 3 = 20$
6. $20 - 15 = _____$
7. $20 - _____ = 18$
8. If you have time: $_____ - 5 = 20$

Launch

- Groups of 2: different than the previous activity
- Give groups access to connecting cubes.
- "You are going to find the number that makes each equation true. Switch books with someone who you didn't play What's Behind My Back with. Fill in the number that makes each equation true. Be prepared to share with your partner how you found each number."
- 3 minutes: independent work time
- "Share your work with your partner. Choose 1 equation and explain to them how you found the number that makes it true."
- 3 minutes: partner discussion

Student Responses

1. 16. Sample response: $4 + 6 = 10$, $10 + 10 = 20$, $6 + 10 = 16$
2. 16. Sample response: If $4 + 16 = 20$ then $20 - 16 = 4$
3. 14. Sample response: $6 + 4 = 10$, $10 + 10 = 20$, $4 + 10 = 14$
4. 10. Sample response: I used 2 towers of 10. I have to take 1 away to have 10 cubes left.
5. 17. Sample response: $20 - 3 = 17$
6. 5. Sample response: I started with 2 tens. I took away 1 ten and 5 cubes from the other tower. I had 5 cubes left.
7. 2. Sample response: I counted back 2 to get to 18.
8. 25. Sample response: $20 + 5 = 25$

Activity

- "Work in your book to find the number that makes each equation true."
- 5 minutes: independent work time
- Monitor for students who look for ways to make 10.

Synthesis

- Invite selected students to show their thinking for $_____ + 3 = 20$ and $20 - _____ = 18$.
- "How did thinking about a ten help them find their answer?" (They knew 20 is 2 tens so they used 1 of the tens to make the problems easier.)

Lesson Synthesis

10 min

"Today, we found the unknown number in equations that makes them true."

Math Community
Display Math Community poster. Explain to students that norms are expectations that help everyone in the room feel safe, comfortable, and productive doing math together.

"We are going to make a list of norms for how we do math together. One example of a norm is 'Listen as others share their ideas.' What other norms should we set for our class?"

Share and record responses.

Suggested Centers

- Number Puzzles: Addition and Subtraction (1–4), Stage 1: Within 10 (Supporting)

Complete Cool-Down

Response to Student Thinking

Students know sums within 20, but incorrectly identify subtraction expressions.

Next Day Support

- After the warm-up, ask students to find ways to make 10 to find the number that makes each equation in the cool-down true.

The work in this lesson builds from the subtraction concepts developed in a prior unit.

Prior Unit Support

Grade 1, Unit 3, Section D: Subtract within 20

Lesson 4: Add and Subtract Your Way

Standards Alignments

Addressing 2.OA.B.2

Teacher-facing Learning Goals

- Add and subtract within 20 in a way that makes sense to them.

Student-facing Learning Goals

- Let's add and subtract within 20.

Lesson Purpose

The purpose of this lesson is for students to add and subtract within 20 in a way that makes sense to them.

The work in this lesson builds from grade 1, where students add and subtract within 20 with different strategies. This is a chance to formatively assess how students find sums and differences in this range. Connecting cubes organized in towers of 10 and singles should be made available for students to use, however encourage students not to use them if they don't need them. By the end of grade 2, students must fluently add and subtract within 20.

Math Community
Tell students that, at the end of the lesson, they will be asked to identify specific examples of norms they experienced as they did math.

Access for:

Students with Disabilities

- Action and Expression (Activity 1)

English Learners

- MLR2 (Activity 1)

Instructional Routines

Number Talk (Warm-up)

Materials to Gather

- Connecting cubes: Activity 2
- Number cards 0–10: Activity 1

Materials to Copy

- How Close? Stage 1 Recording Sheet (groups of 1): Activity 1

Lesson Timeline

Warm-up	10 min
Activity 1	20 min
Activity 2	15 min
Lesson Synthesis	10 min
Cool-down	5 min

Teacher Reflection Question

By the end of grade 2, students must be fluent with addition and subtraction within 20, including knowing all sums of 2 one-digit numbers by memory. What did you learn about your students during today's activities that will help you prepare all students to meet this standard?

Cool-down (to be completed at the end of the lesson)

5 min

Sums and Differences

Standards Alignments

Addressing 2.OA.B.2

Student-facing Task Statement

Find the value of each expression. Show your thinking using drawings, numbers, or words.

1. $8 + 6$
2. $13 - 5$
3. $16 - 4$

Student Responses

1. 14. Sample response: $8 + 2 = 10$, $10 + 4 = 14$
2. 8. Sample response: $13 - 3 = 10$, $10 - 2 = 8$
3. 12. Sample response: I just subtracted the ones $6 - 4 = 2$

Begin Lesson

Warm-up

10 min

Number Talk: Make 10

Standards Alignments

Addressing 2.OA.B.2

The purpose of this Number Talk is to elicit strategies and understandings students have for making a ten to add. When students look for ways to decompose an addend to make 10, students look for and make use of the structure of numbers and the properties of operations (MP7). These understandings help students develop fluency and will be helpful later in this lesson when students will need to be able to add within 20.

Instructional Routines

Number Talk

Student-facing Task Statement

Find the value of each sum mentally.

- $8 + 2$
- $8 + 3$
- $8 + 5$
- $7 + 6$

Student Responses

- 10: I just know it.
- 11: $8 + 2 = 10$ and $8 + 3$ is just 1 more.
- 13: 5 can be broken into 2 and 3. $8 + 2 = 10$ and $10 + 3 = 13$
- 13: $7 + 3 = 10$ and $10 + 3 = 13$

Launch

- Display one expression.
- "Give me a signal when you have an answer and can explain how you got it."
- 1 minute: quiet think time

Activity

- Record answers and strategy.
- Keep expressions and work displayed.
- Repeat with each expression.

Synthesis

- "How does making 10 help in finding the value of the sums?" (It helped me because I was able to use facts I already know. I know $7 + 3 = 10$ and I know $10 + 3 = 13$.)

Activity 1

20 min

Revisit How Close?

Standards Alignments

Addressing 2.OA.B.2

The purpose of this activity is for students to revisit stage 1 of the How Close center, which was first introduced in grade 1. Students pick 5 digit cards and then choose 3 to make an expression that has a value as close as possible to the target number, which is 20 in stage 1. Students may use a variety of strategies such as making a 10 to add two numbers or using the relationship between addition and subtraction to strategically choose 3 numbers (MP7).

Access for English Learners

MLR2 Collect and Display. Circulate and collect the language students use as they play the game and compare equations. On a visible display, record words and phrases such as: make ten, add, addition, sum, take away, difference, value, and equation. Invite students to borrow language from the display as needed, and update it throughout the lesson.
Advances: Conversing, Reading

Access for Students with Disabilities

Action and Expression: Develop Expression and Communication. Provide access to ten frames or connecting cubes. Students can use two different colors to represent the two addends or the minuend.
Supports accessibility for: Organization, Conceptual Processing

Materials to Gather

Number cards 0–10

Materials to Copy

How Close? Stage 1 Recording Sheet (groups of 1)

Student-facing Task Statement

5	8	2	4

Launch

- Groups of 2
- Give each group a set of cards. Have them remove the number 10 cards.
- Display the digit cards at the top of the

6

student page.

- “We are going to play a game called How Close. Let’s play 1 round together.”
- “Look at the 5 cards. Think about which 3 cards you would choose to add together to get close to 20.”
- 1 minute: quiet think time
- 2-3 minutes: partner work time
- Share responses.
- “After you choose your 3 cards, you will write an equation showing the sum.”
- Demonstrate writing an equation to show the sum of the 3 cards that get closest to 20.
- “When you have your equation written, compare it with your partner’s to see who found a sum closer to 20.”
- “Then you will replace the cards you used and play again.”

Activity

- "Now play How Close with your partner."
- 10 minutes: partner work time
- Monitor for students who:
    - try to make 10 and then add the greatest number possible to it
    - add the 2 greatest numbers and then look for the other number needed to make 20

Synthesis

- “What methods did you use to find a sum close to 20?
- Invite previously selected students to share their strategies.

Activity 2

15 min

Add and Subtract within 20

Standards Alignments

Addressing 2.OA.B.2

The purpose of this activity is for students to add and subtract within 20 using any method that makes sense to them. In the previous activity, students shared methods they used to add within 20. This activity gives students an opportunity to try some of the methods they discussed. In this activity, students also subtract within 20 and will discuss their methods in the synthesis.

Materials to Gather

Connecting cubes

Student-facing Task Statement

Find the value of each expression.

Show your thinking using drawings, numbers, or words.

1. $4 + 9$
2. $15 - 3$
3. $7 + 6$
4. $17 - 9$
5. $14 + 5$
6. $12 - 4$
7. $6 + 12$
8. $16 - 5$

Student Responses

1. 13. Sample response: $9 + 1 = 10$, $10 + 3 = 13$

Launch

- Groups of 2
- Give students access to connecting cubes.
- “Now we are going to add and subtract within 20. Think about how you can show your thinking so others can understand.”
- “You have time to work independently before sharing your thinking with a partner.”

Activity

- 5 minutes: independent work time
- 5 minutes: partner discussion
- Monitor for different methods used to find the value of $17 - 9$. For example:
  - adding on to make 10 ($9 + 1 = 10$, $10 + 7 = 17$, $1 + 7 = 8$)
  - decomposing one number to get to 10 first ($17 - 7 = 10$, $10 - 2 = 8$)

2. 12. Sample response: I counted back. 14, 13, 12
3. 13. Sample response: $7 + 7 = 14$, $14 - 1 = 13$
4. 8. Sample response: $9 + 1 = 10$, $10 + 7 = 17$, $1 + 7 = 8$
5. 19. Sample response: $4 + 5 = 9$ so $14 + 5 = 19$
6. 8. Sample response: I know $8 + 4 = 12$
7. 18. Sample response: $6 + 2 = 8$ so $6 + 12 = 18$
8. 11. Sample response: $6 - 5 = 1$ so $16 - 5 = 11$

Synthesis

- Display 17 – 9.
- Select previously identified students to share their strategies.

Advancing Student Thinking

If students are counting all of the cubes by 1 or working with loose cubes, consider asking: "How could you use towers of 10 to help you find the sums or differences?"

Lesson Synthesis

10 min

"Today we worked with a partner to play a game about adding and subtracting within 20."

Math Community

Display Math Community poster.

Ask students for any additions or revisions to their math community norms.

Share and record responses.

Suggested Centers

- Number Puzzles: Addition and Subtraction (1–4), Stage 1: Within 10 (Supporting)

Complete Cool-Down

Response to Student Thinking

Students show evidence in their explanations or drawings that they count on by ones to find the value of sums and differences within 20.

Next Day Support

- Encourage students to use connecting cubes in towers of 10 and singles.

Lesson 5: Add Within 50

Standards Alignments

Building On	1.NBT.C.4
Addressing	2.NBT.B.5

Teacher-facing Learning Goals

- Add within 50 in a way that makes sense to them.

Student-facing Learning Goals

- Let's add within 50.

Lesson Purpose

The purpose of this lesson is for students to add within 50. Students find the value of sums within 50 in any way that makes sense to them.

Students added within 100 in grade 1. This lesson serves as a formative assessment of how students find the value of sums with larger addends. Throughout the lesson, monitor for students who look for and make use of the structure of place value to add tens to tens and ones to ones (MP7).

Math Community

Tell students that, at the end of the lesson, they will be asked to reflect on the norms and they can add norms about working with a partner.

Access for:

Students with Disabilities

- Representation (Activity 1)

English Learners

- MLR8 (Activity 2)

Instructional Routines

Number Talk (Warm-up)

Materials to Gather

- Connecting cubes: Activity 2
- Number cards 0–10: Activity 1

Materials to Copy

- How Close? Stage 3 Recording Sheet (groups of 1): Activity 1

Lesson Timeline

Warm-up	10 min
Activity 1	20 min
Activity 2	15 min
Lesson Synthesis	10 min
Cool-down	5 min

Teacher Reflection Question

In what ways is the math community you are working to foster going well? What actions can you take to continue to build community?

Cool-down (to be completed at the end of the lesson)

5 min

What's the Value of the Sum?

Standards Alignments

Addressing 2.NBT.B.5

Student-facing Task Statement

Find the value of each sum. Show your thinking using drawings, numbers, or words.

1. $26 + 6$
2. $32 + 17$
3. $28 + 14$

Student Responses

32. Sample response: $26 + 4 = 30$, $30 + 2 = 32$
49. Sample response: $30 + 10 = 40$, $2 + 7 = 9$, $40 + 9 = 49$
42. Sample response: $28 + 14 = 30 + 12 = 42$

Begin Lesson

Warm-up

10 min

Number Talk: Two-Digit, One-Digit

The purpose of this Number Talk is to elicit strategies and understandings students have for adding a one-digit number to a two-digit number. These understandings help students develop fluency and will be helpful later in this lesson when students will need to be able to add within 50.

Instructional Routines

Number Talk

Student-facing Task Statement

Find the value of each sum mentally.

- $16 + 3$
- $16 + 5$
- $26 + 5$
- $38 + 6$

Student Responses

- 19: $3 + 6 = 9$ so $13 + 6 = 19$
- 21: $16 + 4 = 20$ and 1 more is 21
- 31: $26 + 4 = 30$ and 1 more is 31
- 44: 6 can be broken into 2 and 4. $38 + 2 = 40$ and $40 + 4 = 44$

Launch

- Display one expression.
- "Give me a signal when you have an answer and can explain how you got it."
- 1 minute: quiet think time

Activity

- Record answers and strategy.
- Keep expressions and work displayed.
- Repeat with each expression.

Synthesis

- "How does looking for ways to make 10 help to find the value of the sum with larger numbers?" (You can make a ten with the ones and then add the other tens back on. $38 + 6$, $8 + 2 = 10$, $10 + 30 + 4 = 44$.)

Activity 1

20 min

Revisit How Close, Add to 100

Standards Alignments

Building On	1.NBT.C.4
Addressing	2.NBT.B.5

The purpose of this activity is for students to learn stage 3 of the How Close center which was introduced in grade 1. In this stage, each student picks 7 cards and chooses 4 of them to create 2 two-digit numbers. Each student adds the numbers and the student whose sum is closest to 100 wins a point for the round. It is recommended that at this point in the year, students begin with a target number of 50 instead of 100 in this stage.

If students are not yet able to make 2 numbers that get close to 50, encourage them to choose 2 cards, make a 2 digit number and represent the number with cubes. Then determine how many more cubes they need to get to 50 and choose the 2 cards that will get closest to that number.

Access for Students with Disabilities

Representation: Internalize Comprehension. Begin by asking, "Do you remember the game, 'How Close?'" Invite students to recall strategies that helped them work within 20. Ask them to think about how the game will change when the target is 50.
Supports accessibility for: Memory, Attention, Organization

Materials to Gather

Number cards 0–10

Materials to Copy

How Close? Stage 3 Recording Sheet (groups of 1)

Student-facing Task Statement

3	8	4	6
6	2	1	

Launch

- Groups of 2
- Give one set of digit cards to each group.
- "Today we are going to play another game of How Close. This time we will play Close to 50."
- Display the digit cards at the top of the student page.
- "We start with 7 cards again. Think about what cards you would choose to make 2 two-digit numbers that have a sum close to 50."
- 1 minute: quiet think time
- 2-3 minutes: partner work time
- Share responses.
- "After you make your two-digit numbers, you will write an equation showing the sum."

- Demonstrate writing an equation on the recording sheet.
- “Now, we see whose sum is closer to 50. Talk to your partner about how you could figure it out.” (You can count up or back from 50 and see whose number is closer.)
- 30 seconds: quiet think time
- 1 minute: partner discussion
- “Then you will replace the cards you used and play again.”

Activity

- "Now play How Close with your partner."
- 10 minutes: partner work time

Synthesis

- Display digit cards from the student page.
- “Diego made the number 38. What number could Diego make next to get close to 50?”

Activity 2

15 min

Add within 50

Standards Alignments

Building On	1.NBT.C.4
Addressing	2.NBT.B.5

In this activity, students find the value of sums with larger numbers using any method that makes sense to them. They may represent their thinking using connecting cubes, drawings, equations, or words. Monitor for the ways students use methods based on place value, including the language they use to describe composing a ten when adding tens and tens and ones and ones (MP3, MP6).

Access for English Learners

MLR8 Discussion Supports. Synthesis: After a strategy is presented to the class, invite students to turn to a partner and restate what they heard in their own words. Encourage students to borrow language from a display with words and phrases collected from previous lessons.
Advances: Listening, Speaking

Materials to Gather

Connecting cubes

Required Preparation

- Create connecting cubes in towers of 10 and singles.

Student-facing Task Statement

Find the value of each sum. Show your thinking using drawings, numbers, or words.

1. $37 + 8$
2. $24 + 23$
3. $16 + 30$
4. $39 + 11$
5. $27 + 15$

Student Responses

1. 45. Sample response: $37 + 3 = 40$, $40 + 5 = 45$
2. 47. Sample response: $20 + 20 = 40$, $4 + 3 = 7$, $40 + 7 = 47$
3. 46. Sample response: $30 + 10 = 40$, $40 + 6 = 46$
4. 50. Sample response: $39 + 1 = 40$, $40 + 10 = 50$
5. 42. Sample response: $20 + 10 = 30$, $7 + 5 = 12$, $30 + 12 = 42$

Launch

- Groups of 2
- Give students access to connecting cubes in towers of 10 and singles.
- "Now we are going to add larger numbers. Think about how you can show your thinking so others can understand."
- "You have time to work independently before sharing your thinking with a partner."

Activity

- 5 minutes: independent work time
- 5 minutes: partner discussion
- Monitor for students who:
  - Add by place value ($27 + 15$, $20 + 10 = 30$, $7 + 5 = 12$, $30 + 12 = 42$)
  - Decompose 1 number to make a 10, then add the rest ($27 + 15$, $27 + 3 = 30$, $30 + 12 = 42$)

Synthesis

- Display $27 + 15$.

- Select previously identified students to share.

Lesson Synthesis

10 min

"Today, we played another game with a partner. We also worked through some problems independently before sharing our thinking with others. Let's add to our chart from yesterday."

Display chart from previous lesson and read the norms to students.

"What norms would you like to add?"

Suggested Centers

- Number Puzzles: Addition and Subtraction (1–4), Stage 1: Within 10 (Supporting)

Complete Cool-Down

Response to Student Thinking

Students find values other than 32, 49, and 42 for the sums.

Students find the value of $32 + 17$, but find a value other than 42 for $28 + 14$.

Next Day Support

- After the warm-up, ask students to discuss their answers to the cool-down with a partner. Ask students to share how they can use one of the ways shared in the warm-up to find the value of one of the expressions from the cool-down.

The work in this lesson builds from the addition concepts developed in a prior unit.

Prior Unit Support

Grade 1, Unit 4, Section A: Units of Ten

Lesson 6: Center Day 1 (Optional)

Standards Alignments

Addressing 2.NBT.B.5, 2.OA.B.2

Teacher-facing Learning Goals

- Learn the structure of center day lessons.
- Practice adding and subtracting within 10 or 20.
- Practice adding within 50.

Student-facing Learning Goals

- Let's add and subtract in center activities.

Lesson Purpose

The purpose of this lesson is for students to practice adding and subtracting within 10, 20, or 50.

This lesson is optional because it is an opportunity for extra practice that not all classes may need. In both activities, students have a choice between 2 centers introduced in previous lessons. Students choose the center they would like to participate in, and work with a partner on that activity. Use this lesson as an opportunity to establish structures for centers for the year, such as how materials will be organized, how many students will work at each center, how students will transition from one center to another, and how students will work together with partners at each center.

Math Community

Tell students they will reflect on their identified norms at the end of this lesson.

Instructional Routines

Number Talk (Warm-up)

Materials to Gather

- Number cards 0–10: Activity 2

Materials to Copy

- Number Puzzles Addition and Subtraction Stage 2 Gameboard (groups of 1): Activity 1
- Number Puzzles Digit Cards (groups of 2): Activity 1

Lesson Timeline

Warm-up	10 min

Teacher Reflection Question

How can you use what you learned today about your students and the structure of centers to

Activity 1	15 min
Activity 2	25 min
Lesson Synthesis	10 min

implement centers in your upcoming lessons?

Begin Lesson

Warm-up

10 min

Number Talk: Teen Numbers, Two-digit Numbers

Standards Alignments

Addressing 2.NBT.B.5

The purpose of this Number Talk is to elicit strategies and understandings students have for strategies for adding based on place value. These understandings help students develop fluency and will be helpful later in this lesson when students will need to be able to add 2 two-digit numbers within 50, and throughout the year as students develop fluency adding within 100.

Instructional Routines

Number Talk

Student-facing Task Statement

Find the value of each expression mentally.

- $14 + 22$
- $19 + 22$
- $15 + 25$
- $17 + 25$

Student Responses

- 36: $14 + 20 = 34$, $34 + 2 = 36$
- 41: $19 + 1 = 20$, $20 + 21 = 41$

Launch

- Display one expression.
- "Give me a signal when you have an answer and can explain how you got it."
- 1 minute: quiet think time

Activity

- Record answers and strategy.
- Keep expressions and work displayed.
- Repeat with each expression.

- 40: $15 + 25 = 25 + 10 = 35$, $35 + 5 = 40$
- 42: $17 + 3 = 20$, $20 + 22 = 42$

Synthesis

- “We have seen lots of different ways to find the sum of 2 two-digit numbers. There will be more opportunities to try out different methods as we work in centers today.”

Activity 1

15 min

Revisit Number Puzzles, Within 20

Standards Alignments

Addressing 2.OA.B.2

The purpose of this activity is for students to revist stage 2 of the Number Puzzles center which was first introduced in grade 1. Students work together to use digit cards to make addition and subtraction equations within 20 true. Each digit card may only be used one time on a page.

Materials to Copy

Number Puzzles Addition and Subtraction Stage 2 Gameboard (groups of 1), Number Puzzles Digit Cards (groups of 2)

Required Preparation

- Create one set of digit cards from the Instructional master for each group of 2.

Launch

- Groups of 2
- Give each group a set of digit cards and game boards.
- “We are going to play a game you may have played in first grade called Number Puzzles."
- "In this game, you use digit cards to make each equation true. You can only use each digit card once on the game board.”

Activity

- 10 minutes: center work time

Synthesis

- Display Puzzle 1.
- “Which equation would you start with? Why would you start there?”

Activity 2

25 min

Centers: Choice Time

Standards Alignments

Addressing 2.NBT.B.5

The purpose of this activity is for students to again choose from activities that focus on adding or subtracting.

Students choose from any stage of previously introduced centers.

- What's Behind My Back?
- How Close?
- Number Puzzles

Materials to Gather

Number cards 0–10

Required Preparation

Gather Materials from:

- What's Behind My Back, Stages 2 and 3
- How Close, Stages 1–3
- Number Puzzles, Stages 1 and 2

Student-facing Task Statement

Choose a center.

What's Behind My Back?

How Close?

$\square\square + \square\square = ____$

Number Puzzles

$14 = 8 + \square$

Launch

- “Now you can choose a different center.”
- Display the center choices in the student book.
- “Think about which center you would like to work on now.”
- 30 seconds: quiet think time

Activity

- Invite students to work at the center of their choice.
- 10 minutes: center work time
- "Choose what you would like to do next."
- 10 minutes: center work time

Synthesis

- “What is one thing you learned or got better at by working on the activity you chose?”

Lesson Synthesis

10 min

“Today we chose activities to work on and worked with a partner during center time.”

Math Community

Display chart from previous lesson and read the norms to students.

“What went well? What can we continue to work on?”

Section B: Ways to Represent Data

Lesson 7: Collect and Represent Data

Standards Alignments

Building On	1.MD.C.4
Building Towards	2.MD.D.10

Teacher-facing Learning Goals

- Analyze different representations of the same data to identify common features.
- Represent data in a way that makes sense to them.

Student-facing Learning Goals

- Let's organize data and share with others.

Lesson Purpose

The mathematical purpose of this lesson is to elicit and build on students' previous understandings and experiences with organizing and representing **data**.

In grade 1, students collected data and represented it in different ways. In this lesson, students collect data about their class, answer questions, discuss the need to represent data in an organized way, and create their own representations of their data. Throughout the lesson monitor for the different ways students choose to organize and represent the data and ask them about the decisions they make. In upcoming lessons, students learn how to interpret and represent data using picture and bar graphs.

In this lesson, students collect data about the question "How do we get to school?" If this question is not relevant to your class, choose a different survey question or change the categories to be more relevant for your students.

Access for:

Students with Disabilities

- Representation (Activity 1)

Instructional Routines

MLR7 Compare and Connect (Activity 2), Notice and Wonder (Warm-up)

Materials to Gather

- Chart paper: Activity 1
- Glue: Activity 2
- Markers: Activity 2
- Materials from a previous activity: Activity 2
- Scissors: Activity 1, Activity 2
- Stickers: Activity 2
- Tape: Activity 1, Activity 2

Materials to Copy

- How We Get to School (groups of 1): Activity 1

Lesson Timeline

Warm-up	10 min
Activity 1	15 min
Activity 2	20 min
Lesson Synthesis	10 min
Cool-down	5 min

Teacher Reflection Question

In grade 1, students organized and represented data with up to three categories. How did you see or hear students demonstrate their understanding of different ways to organize data?

Cool-down (to be completed at the end of the lesson)

5 min

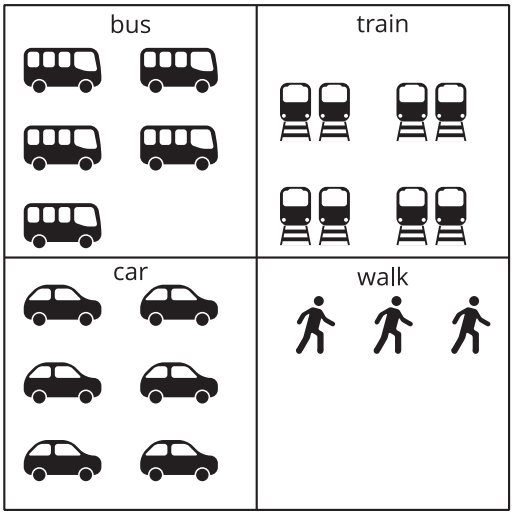
Organize Data

Standards Alignments

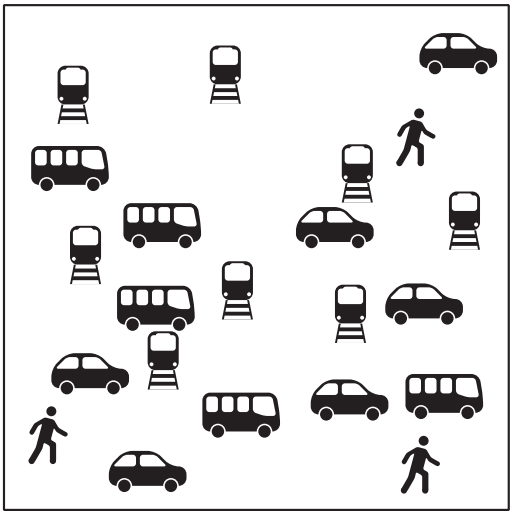
Building Towards 2.MD.D.10

Student-facing Task Statement

Mai and Priya showed how the students in their class traveled to school.



Mai's way



Priya's way

How are Mai's way and Priya's way the same? How are they different?

Student Responses

Sample responses:

- They both use pictures. Mai grouped the pictures together.
- They both have the same number of pictures. Mai used words and grouped the pictures together.

Begin Lesson

Warm-up

10 min

Notice and Wonder: Let’s Get There

Standards Alignments

Building Towards 2.MD.D.10

The purpose for this warm-up is to invite students to notice and wonder about pictures of transportation that will be used later in the lesson. They may notice that all the pictures are forms of transportation that people in the community use to get around. This leads into the next activity, in which students collect data about how they got to school.

Instructional Routines

Notice and Wonder

Student-facing Task Statement

What do you notice? What do you wonder?

Student Responses

Sample responses:

- There is a car.
- They are all ways we can get around.
- Lots of them have wheels.
- Why is there a person with these pictures?

Launch

- Groups of 2
- Display the image.
- "What do you notice? What do you wonder?"
- 1 minute: quiet think time

Activity

- "Discuss your thinking with your partner."
- 1 minute: partner discussion
- Share and record responses.

Synthesis

- “We are going to keep thinking about these ways of getting around in our first activity today.”

Activity 1

15 min

How Do We Get to School?

Standards Alignments

Building Towards 2.MD.D.10

The purpose of this activity is for students to collect data and represent it to create a class display. In this activity, students are asked a question and choose a picture to represent their response. When students are invited to add their picture to the class display, do not provide additional guidance on what the display should look like. Students may choose to add their picture next to other pictures that are the same or next to their partner's or other friends' pictures without attention to category. It is ok if the display looks disorganized. In the synthesis, students answer questions about the data and may see that it could be easier to answer these questions if the data were represented in a more organized way.

Access for Students with Disabilities

Representation: Access for Perception. Provide access to concrete objects, such as connecting cubes, that students can use to represent and organize each data point.
Supports accessibility for: Conceptual Processing, Organization

Materials to Gather

Chart paper, Scissors, Tape

Materials to Copy

How We Get to School (groups of 1)

Required Preparation

- Create a chart titled, "How we got to school today" to display in the launch.
- Each student needs a pair of scissors and access to tape.
- Have extra copies of the Instructional master available.

Student-facing Task Statement

Choose the picture that shows how you got to school today.

Write your name on the picture.

Student Responses

Charts will vary by classroom.

Launch

- Groups of 2
- Display the chart paper titled “How We Got to School Today.”
- Give each students a pair of scissors, a copy of the Instructional master, and access to tape.
- "What are some of the different ways people get to our school? What are other ways people may get to school in other places?"

Activity

- “Choose the picture that shows how you got to school today.”
- “Write your name on the picture.”
- Invite students to add their picture to the chart.

Synthesis

- “How could we find out how many students in our class took the bus to school today?” (We could count all the pictures of buses.)
- “What other questions could we ask about how we got to school today based on our chart?” (How many students walked to school? How many students rode in a car?)
- "Is it easy to answer these questions from our chart just by looking at it? Why or why not?" (No, the pictures are all over, you might lose count. It'd be easier if they were in lines or together. Yes, you can just count each picture.)

Activity 2

20 min

Visual Representations of Data

Standards Alignments

Building On	1.MD.C.4
Building Towards	2.MD.D.10

The purpose of this activity is for students to represent data in an organized way. In grade 1, students were introduced to each of the representations shown in the Student Responses section below.

Students should have access to tools that may help them represent the data (for example, extra

copies of the pictures from Activity 1, scissors, glue or tape, markers, or stickers). Throughout the activity, they make their own decisions about what to use to represent the data and reflect on their choices (MP5). The activity can serve as a formative assessment to see what students already know about representing data. During the lesson synthesis, students see different representations and discuss the similarities and differences of each.

This activity uses *MLR7 Compare and Connect*. Advances: representing, conversing.

Instructional Routines

MLR7 Compare and Connect

Materials to Gather

Glue, Markers, Materials from a previous activity, Scissors, Stickers, Tape

Required Preparation

- Each group of 2 needs access to extra copies of the Instructional master from the previous activity, glue, markers, scissors, tape, and stickers.

Student-facing Task Statement

Organize and represent the **data** about how our class gets to school.

Student Responses

Sample responses:

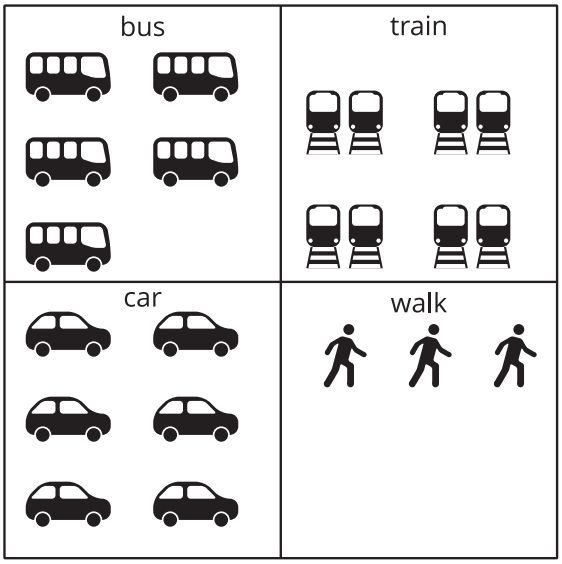
1. Organizes the pictures

Launch

- Groups of 2
- Give each group access to markers, stickers, glue, and tape.

Activity

- "Organize and represent the data we collected in a visual display."
- "**Data** is information about the things or people in a group."
- "Think about how you can represent the data in a way that will make sense to other people."
- 8 minutes: independent work time
- Monitor for a students who:
  - organizes pictures into groups
  - uses tally marks or other symbols
- 5 minutes: gallery walk



2. Makes lists

bus	car	walk	train
Seraphina	Liam	Lune	Thai
Arjun	Carrie	Carlos	Aishlinn
Xander	Nia	Elijah	Paul
Lisa	Jareb		Somari
Dougie	Micah		Beverly
	Rand		Mandy
	Dina		Otis
			Gary

3. Uses tally marks
   - car IIIIIII
   - bus IIIII
   - walk III
   - train IIIIIIII
4. Writes numbers in a table

car	7
bus	5
walk	3
train	8

Synthesis

MLR7 Compare and Connect

- Display a student's representation that used pictures and a student's representation that used marks or other symbols.
- "What is the same and what is different between these representations?"
- 30 seconds quiet think time
- 1 minute: partner discussion
- "What suggestions do you have for _____ to make their representation more clear?" (_____ could count up the marks and put how many in all for each group.)

Lesson Synthesis

10 min

"Today, we saw that there are different ways to represent **data** in an organized way."

Display 2 representations in which students grouped pictures or symbols to represent each category in different ways.

"How does each representation help you see how many students took the bus?" (I could see that there are 5 buses because they are lined up in a row. I see the number 5 next to the word bus. I see there are 5 tallies next to the word bus.)

"What makes a data display organized and clear to read?" (Its easier to read if things that are alike are together. You can put things that are alike in groups. You can use words and numbers to label things.)

Share responses.

Suggested Centers

- How Close? (1–5), Stage 3: Add to 100 (Addressing)
- Sort and Display (1–3), Stage 1: Any Way (Supporting)

Complete Cool-Down

Response to Student Thinking

Students share a way the representations are the same or a way they are different, but not both. Students do not finish sharing what they notice about the representations in writing.

Next Day Support

- During the warm-up of the next day display the cool-down from the previous lesson and ask, "What did you learn yesterday that was helpful in this activity?"

The work in this lesson builds from the measurement and data concepts developed in a prior unit.

Prior Unit Support

Grade 1, Unit 1, Section B: Show Us Your Data

Lesson 8: Interpret Picture Graphs

Standards Alignments

Building On	1.OA.C.5, 2.MD.D.10
Addressing	2.MD.D.10

Teacher-facing Learning Goals

- Answer questions based on a picture graph.
- Determine whether a question can be answered by a given picture graph.
- Interpret data represented in a picture graph.

Student-facing Learning Goals

- Let's answer questions based on picture graphs.

Lesson Purpose

The purpose of this lesson is for students to read and interpret a **picture graph**, which is a standard way of representing data.

In the previous lesson, students looked at different ways to organize data to make it easier to ask and answer questions about data. In this lesson, students are introduced to a picture graph as a way to represent data. Throughout the lesson, students make sense of the structure and features of a picture graph as they consider what they can learn from a picture graph and the types of questions a picture graph can and cannot be used to answer. They use picture graphs to answer questions about how many are in a category as well as questions that ask them to combine or compare categories.

Access for:

Students with Disabilities

- Representation (Activity 2)

English Learners

- MLR8 (Activity 1)

Instructional Routines

How Many Do You See? (Warm-up)

Lesson Timeline

Warm-up	10 min

Teacher Reflection Question

Reflect on who participated in math class today. What assumptions are you making about those

Activity 1	20 min
Activity 2	15 min
Lesson Synthesis	10 min
Cool-down	5 min

who did not participate? How can you leverage each of your students' ideas to support them in being seen and heard in tomorrow's math class?

Cool-down (to be completed at the end of the lesson)

5 min

Use a Picture Graph

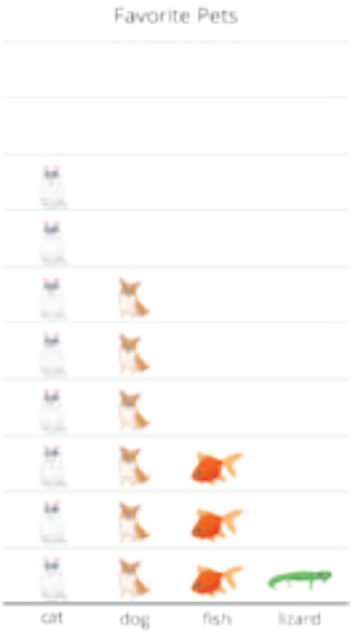
Standards Alignments

Addressing 2.MD.D.10

Student-facing Task Statement

A group of students were asked, "What is your favorite pet?" Their responses are shown in this picture graph.

1. Circle the 2 questions that can be answered by the picture graph.
   A. How many students chose a cat as their favorite pet?
   B. How many more students like rabbits than dogs?
   C. Who owns a lizard?
   D. How many more students chose cats than dogs?
   E. Why don't more students like dogs?
2. Pick a question that can't be answered by the data on the graph. Explain why it can't be answered.



Student Responses

1. A, D

2. For B, the graph doesn't tell us the number of rabbits.
   For C, the graph doesn't tell us the names of the owners.
   For E, the graph doesn't tell us why the students choose their pets.

Begin Lesson

Warm-up

10 min

How Many Do You See: Dots within 10

Standards Alignments

Building On 1.OA.C.5

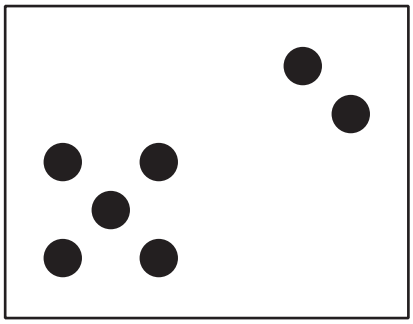
The purpose of this warm-up is for students use grouping strategies to describe the images they see. This is the students' first experience with the "How Many Do You See" routine in grade 2. They may use their knowledge of addition facts or mental strategies to determine the total number of dots. When students notice and use the structure of 5 dots to describe how they see the images, they look for and make use of structure (MP7).

Instructional Routines

How Many Do You See?

Student-facing Task Statement

How many do you see? How do you see them?

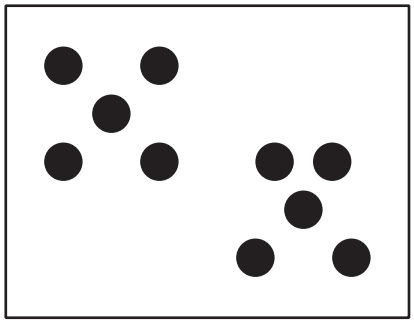


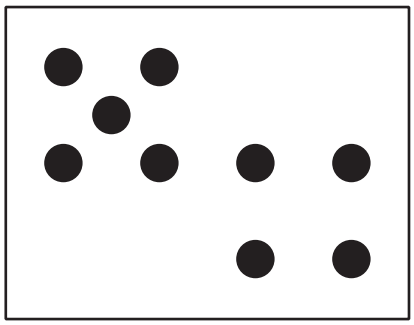
Launch

- Groups of 2
- "How many do you see? How do you see them?"
- Flash image.
- 30 seconds: quiet think time

Activity

- Display image.
- "Discuss your thinking with your partner."
- 1 minute: partner discussion





Student Responses

- 7 dots: I see 5 at the bottom and 2 more at the top.
- 10 dots: I see the 5 at the top and then there's 5 more at the bottom ($5 + 5 = 10$).
- 9 dots: I saw 9 because there was a 5 and a 4 ($5 + 4 = 9$).

- Record responses.
- Repeat for each image.

Synthesis

- "How did your method stay the same or change in each image?" (For the first image I counted on 5, 6, 7. For the second image I knew $5 + 5 = 10$. For the last image I took 1 away from 10.)
- Make connections between the visual representations and the equations that could represent them when recording their responses.

Activity 1

20 min

Veggies People Love

Standards Alignments

Building On 2.MD.D.10

The purpose of this activity is for students to learn a new way of organizing data: a picture graph. In the launch, students engage in a discussion about what they notice about the graph and how a picture graph makes it easier to interpret data. After students discuss the picture graph and consider what they could learn from the graph, wrap up with the following question: "What is the

total number of kids who love spinach or corn?" This question uses "or" to signify the sum of the two categories. This phrasing may be new for students.

Access for English Learners

MLR8 Discussion Supports. Invite students to name the vegetables they see in the picture graph. Some students may benefit from seeing photographs of vegetables they are not familiar with. If necessary, discuss the meaning of the word "veggie."
Advances: Speaking, Conversing

Student-facing Task Statement

Clare asked a group of kids, "What veggies do you love?" Their responses are shown in this **picture graph.**

What can you learn about the veggies kids love from Clare's picture graph?

A group of adults were asked, "What veggies do you love?" Their responses are shown in this picture graph.

Launch

- Groups of 2
- Display "Veggies Kids Love" graph, but cover the title.
- "Clare made this picture graph to share data she collected."
- "What could this graph represent?"
- 30 seconds: quiet think time
- Share responses.
- "Clare asked the kids in her class which vegetable they loved."
- "She made a picture graph to show their responses."
- "A **picture graph** is a way to show how many in each group or category using pictures of the objects or symbols."
- "What can you learn about the veggies kids love from her picture graph?" (The veggie with the most votes is carrots. Not a lot of kids like spinach.)
- 1 minute: quiet think time
- 2 minutes: partner discussion
- Record student responses with complete sentences.
- "What is the total number of kids who love spinach or corn?" (6 kids. Two like spinach and 4 like corn.)

Answer the questions based on the graph.

1. How many adults like spinach?
2. What is the total number of adults who like carrots or corn? Show your thinking using drawings, numbers, or words.
3. Write one fact you learned about the veggies adults love based on the data represented in the picture graph.

Student Responses

1. 2 adults like spinach.
2. 13 adults like carrots or corn. Sample response: $8 + 5 = 13$
3. Sample responses: Only 5 adults like corn. 3 adults like broccoli. 8 adults like carrots.

- 30 seconds: quiet think time
- Share responses

Activity

- “Now you can answer a few questions based on a picture graph showing data about the vegetables the adults at school love.”
- 6 minutes: independent work time
- “Share the fact you wrote for the third question with a partner.”
- 3 minutes: partner discussion

Synthesis

- Display “Veggies Adults Love” graph.
- “How many more adults like carrots than spinach? Explain how you know.” (6 more adults like carrots than spinach. I saw there were 2 for spinach, so I counted the carrots above 2. I did $8 - 2 = 6$ because there were 8 votes for carrots and 2 for spinach.)
- 30 seconds: quiet think time
- Share and record responses

Advancing Student Thinking

If students' response for the number of adults that like carrots or corn doesn't clearly reflect the combined categories, consider asking:

- "Can you explain how you found the total number of adults who like carrots or corn?"

- "Where do you see this in the graph?"

Activity 2

15 min

Answer Questions

Standards Alignments

Addressing 2.MD.D.10

The purpose of this activity is for students to interpret data represented in a picture graph. Students make sense of questions related to the context and decide whether questions can be answered with the data. This type of reasoning helps students make sense of the mathematical elements in a context and interpret and use the data presented in the picture graph to answer questions (MP4). When students read the graph and use methods based on using addition and subtraction or those based on counting on or back from the pictures in the graph, they reason abstractly and quantitatively (MP2).

Access for Students with Disabilities

Representation: Internalize Comprehension. Synthesis: Invite students to identify which details were important to pay attention to. Consider using the sentence frame, “The next time I answer a question about a picture graph, I will look for . . . “
Supports accessibility for: Conceptual Processing

Student-facing Task Statement

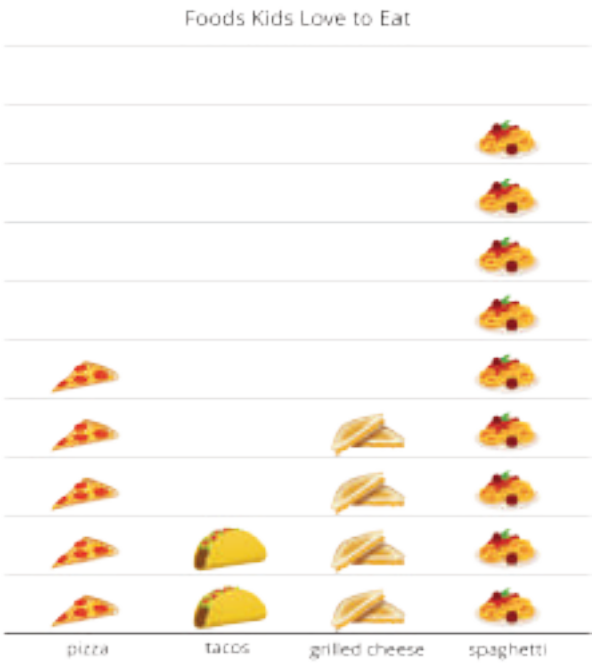
A group of kids were asked, “What foods do you love to eat?” Their responses are shown in this picture graph.

Launch

- Groups of 2

Activity

- “Some questions can be answered using a picture graph, but some questions cannot.”
- “Circle any question that can be answered using the graph.”
- “Then, use the picture graph to answer the



1. Circle the 4 questions that can be answered using the graph.
   a. How many kids chose pizza?
   b. How many chose tacos or grilled cheese?
   c. Why did so many kids choose spaghetti?
   d. How many more kids chose pizza than tacos?
   e. What is the total number of kids who chose spaghetti or pizza?
2. Answer each question you circled.

Student Responses

1. a, b, d, and e
2. a. 5 kids chose pizza.
   b. 6 kids chose tacos or grilled cheese. Sample response: $2 + 4 = 6$
   c. We don't know why they like spaghetti so much.
   d. 3 more kids chose pizza than tacos. Sample response: $5 - 2 = 3$

questions."

- 8 minutes: independent work time
- Compare your responses with a partner.
- 2 minutes: partner discussion
- Monitor for students who explain how they:
  - counted on to find the sum of two categories
  - counted on to find how many more
  - counted the number of pictures in each category and used addition or subtraction

Synthesis

- "Which question did you decide couldn't be answered? Explain." (We don't know why so many kids chose spaghetti. The graph shows how many, but not their reasons.)
- Invite previously identified students to share responses for the questions that asked them to combine categories or compare categories.

e. 14 kids chose spaghetti or pizza.
Sample response: $9 + 5 = 14$

Advancing Student Thinking

If students combine categories when they should find the difference between them, consider asking:

- "How did you decide to combine these two groups?"
- "How could the graph help you think about how many more chose pizza?"
- "How does this match the question?"

Lesson Synthesis

10 min

"Today, you learned about **picture graphs**, which is one way of representing data. What did you learn about how picture graphs can help with answering questions about data? "

Suggested Centers

- How Close? (1–5), Stage 3: Add to 100 (Addressing)
- Sort and Display (1–3), Stage 1: Any Way (Supporting)

Complete Cool-Down

Response to Student Thinking

Students choose questions that cannot be answered by the data, for example "Who chose a lizard?"

Next Day Support

- During the launch of the next day's activity, have students compare a question that cannot be answered by the data with one that can and explain how they know.

The work in this lesson builds from the data concepts developed in a prior unit.

Prior Unit Support

Grade 1, Unit 1, Section B: Show Us Your Data

Lesson 9: Interpret Bar Graphs

Standards Alignments

Addressing	2.MD.D.10
Building Towards	2.MD.D.10

Teacher-facing Learning Goals

- Answer questions based on a bar graph.
- Interpret data represented in a bar graph.

Student-facing Learning Goals

- Let's interpret data in bar graphs.

Lesson Purpose

The purpose of this lesson is for students to interpret data in a **bar graph** in order to answer questions.

In previous lessons, students learned how to interpret categorical data represented in picture graphs and other displays. In this lesson, bar graphs are introduced as another way to represent categorical data. Students compare the features of bar graphs to picture graphs and use the unique features of bar graphs to interpret data and answer questions. When students relate the data to the context it represents and carefully interpret the elements of a graph, they reason abstractly and quantitatively and attend to precision (MP2, MP6).

Access for:

Students with Disabilities

- Action and Expression (Activity 1)

Instructional Routines

MLR6 Three Reads (Activity 2), Notice and Wonder (Warm-up)

Lesson Timeline

Warm-up	10 min
Activity 1	15 min
Activity 2	20 min
Lesson Synthesis	10 min

Teacher Reflection Question

The scale of the bar graph will be important as students solve problems based on data. How did you see students using the scale on the bar graph today?

Cool-down	5 min

Cool-down (to be completed at the end of the lesson) 5 min

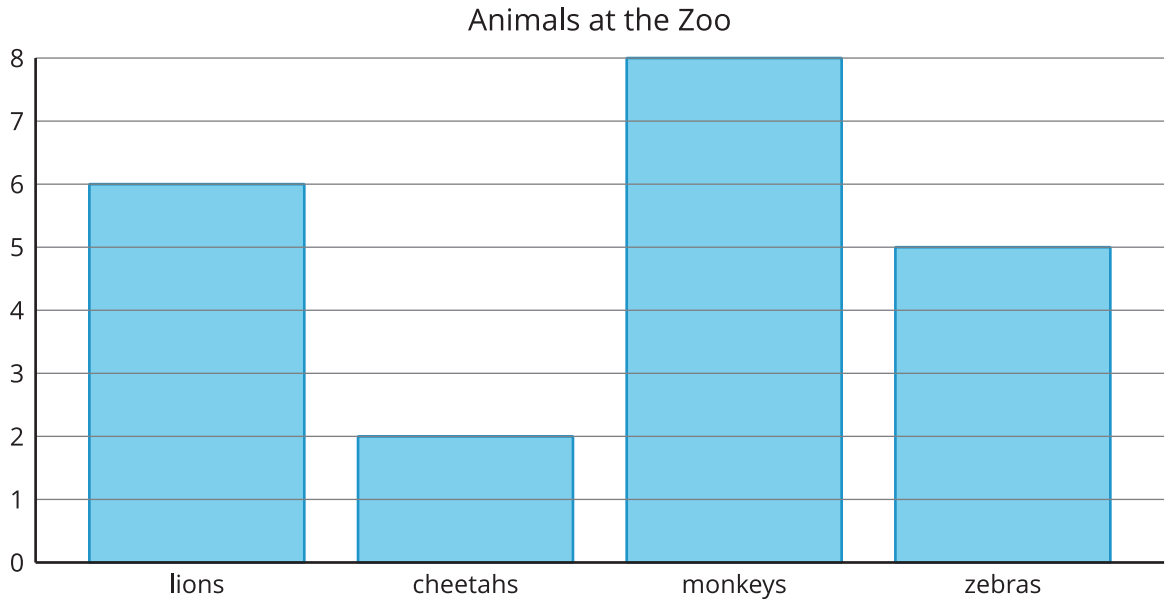
Animals at the Zoo

Standards Alignments

Addressing 2.MD.D.10

Student-facing Task Statement

A zookeeper counted the number of lions, cheetahs, monkeys, and zebras at the zoo. The zookeeper's data is shown in this bar graph.



1. How many monkeys were at the zoo? _____
2. How many lions were at the zoo? _____
3. What is the total number of cheetahs and zebras? _____

Student Responses

1. 8
2. 6

3. 7

Begin Lesson

Warm-up

10 min

Notice and Wonder: Favorite Pets

Standards Alignments

Building Towards 2.MD.D.10

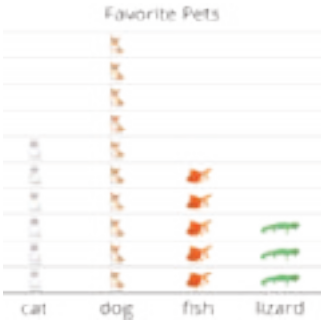
The purpose of this warm-up is for students to make connections between bar graphs and picture graphs. While students may notice and wonder many things about these graphs, focus the synthesis on how the graphs represent the same data in different ways. This conversation leads directly into the next activity, in which students will read and interpret data represented in bar graphs.

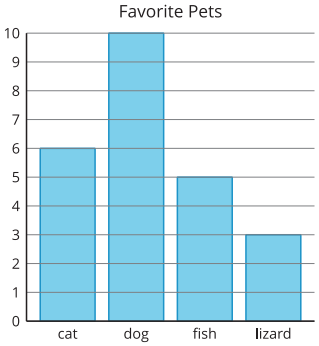
Instructional Routines

Notice and Wonder

Student-facing Task Statement

What do you notice? What do you wonder?





Launch

- Groups of 2
- Display the image.
- “What do you notice? What do you wonder?”
- 1 minute: quiet think time

Activity

- "Discuss your thinking with your partner."
- 1 minute: partner discussion
- Share and record responses.

Synthesis

- “The graph on the right is called a bar graph.

Student Responses

Students may notice:

- One has pictures.
- They have the same animals.
- Dogs have the most in both graphs.

Students may wonder:

- Are they the same?
- Why doesn't the second one show the animals?

A **bar graph** is a way to show how many in each group or category using the length of rectangles."

- "How is the data represented differently in the bar graph compared to the picture graph?" (The number of objects are shown on the scale on the left instead of in pictures. We don't have to count.)

Activity 1

15 min

Field Trip Choices

PLC Activity

Standards Alignments

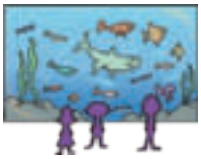
Building Towards 2.MD.D.10

The purpose of this activity is for students to write true statements to show what they can learn about the data in a bar graph. In the synthesis, students match their peers' statements to the graph they think they came from and explain how they know using the features of the graph (MP2, MP3). In order to have a variety of different statements to share in the synthesis, look for ways to encourage students to write statements that combine multiple categories or compare categories. Share examples using the bar graph from the warm-up as needed (for example, 8 total students liked fish or lizards as their favorite pet.)

Access for Students with Disabilities

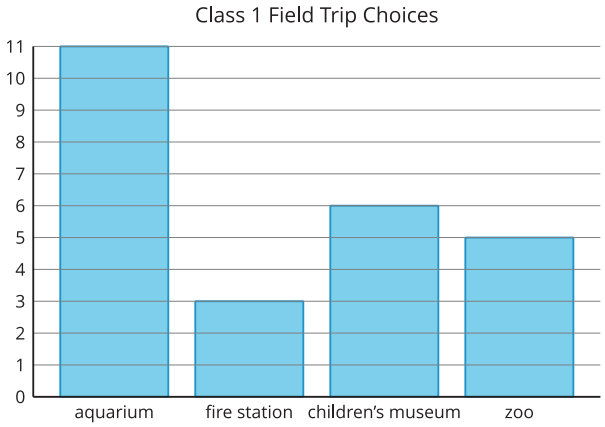
Action and Expression: Develop Expression and Communication. Provide access to different colored connecting cubes that students can use to represent the data when answering the questions. This offers a concrete representation of the two data points to focus attention on.
Supports accessibility for: Conceptual Processing, Organization, Attention

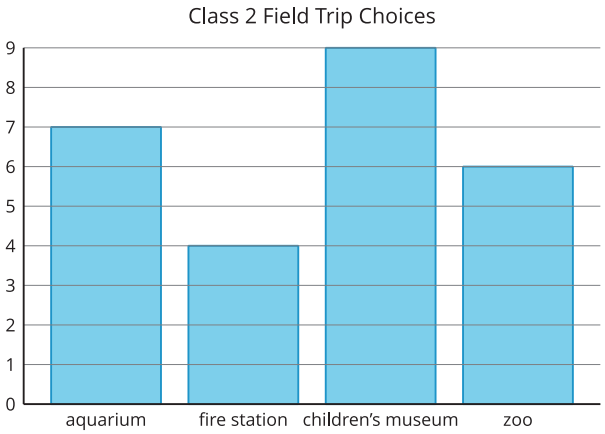
Student-facing Task Statement



Groups of students in different classes were asked, “Where would you like to go for our field trip?” Their responses are shown in the **bar graphs** below.

Write as many statements as you can to show what can be learned about the students’ field trip choices from the bar graph.





Launch

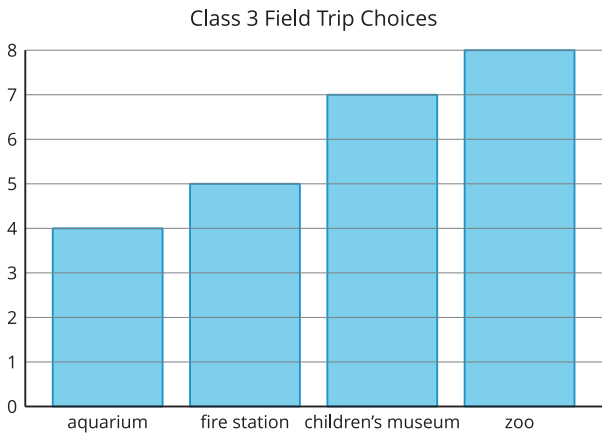
- Groups of 3
- Assign each group a graph to interpret.

Activity

- “With your group, write as many statements as you can to show what can be learned about the students' field trip choices from your graph.”
- "We will share the statements you write with the class to see if they can guess which graph you interpreted."
- 8 minutes: small-group work time
- Monitor for students who create a variety of different statements, including those that combine or compare categories, to share during the activity synthesis. Choose at least 1 group for each graph.

Synthesis

- Invite one of the previously identified groups to share 2–3 of their statements.
- “Which graph did this group interpret? How do you know?”
- Repeat, varying groups that interpreted different graphs, as time permits.



Student Responses

Sample responses for Class 1:

1. 25 students voted.
2. 11 students voted for the children's museum or zoo.
3. The fire station got 3 fewer votes than the children's museum.

Activity 2

20 min

Our Favorite Seasons

Standards Alignments

Addressing 2.MD.D.10

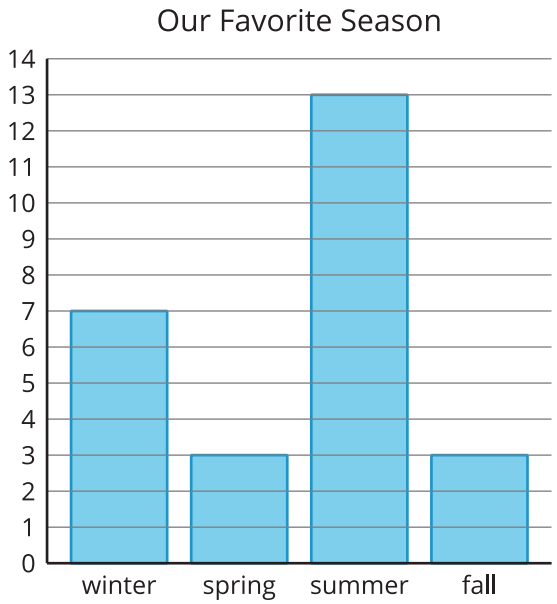
The purpose of this activity is for students to interpret data represented in a bar graph and answer questions about the data. In previous work with picture graphs, students had to count the pictures in order to answer "how many" questions. During this activity, identify students who recognize that they can use the scale (numbers on the side) instead of counting each line or section of the bar. Ask these students to share during the synthesis. It is important for students to consider the benefits of using a bar graph compared to a picture graph.
This activity uses *MLR6 Three Reads. Advances: reading, listening, representing*.

Instructional Routines

MLR6 Three Reads

Student-facing Task Statement

A group of students were asked, "What is your favorite season?" Their responses are shown in the bar graph.



Answer the questions using the graph.

1. How many students voted for summer?
2. What is the total number of students who voted for fall or spring?
3. Which two seasons have a total of 10 votes?
4. How many students voted?

Student Responses

1. 13.
2. 6 students voted for spring or fall.
3. Winter and spring have a total of 10 votes.
4. 26 students voted.

Launch

- Groups of 2
- Display Our Favorite Seasons bar graph, without revealing the questions.

Activity

MLR6 Three Reads

- "Here is a bar graph showing data collected about students' favorite seasons. We are going to read this graph 3 times."
- 1st Read: "Take a moment to read the data displayed by this graph."
- "What is this graph about?"
- 1 minute: partner discussion
- Listen for and clarify any questions about the context.
- 2nd Read: "Read and interpret the bar graph a second time. What can be counted or measured in this situation?" (number of students who voted for each season, number of students who voted)
- 30 seconds: quiet think time
- 2 minutes: partner discussion
- Record quantities on a display for all to see.
- 3rd Read: Read the question(s) aloud.
- "How can we use the bar graph to answer these questions?"
- 30 seconds: quiet think time
- 1–2 minutes: partner discussion
- "Use the bar graph to answer the questions."
- 7 minutes: independent work time

- Monitor for students who:
  - count each section of the bars
  - use the scale
  - create equations to record how they combine categories
- If some students finish early, you can ask them to write statements about what can be learned or other questions that can be asked about the data in the bar graph.

Synthesis

- Invite previously identified students to share how they used the bar graph to find how many students voted for summer.
- Invite previously identified students to share how they found the total number of students who voted.

Lesson Synthesis

10 min

Display the bar graphs from the warm-up.

“Today we interpreted data represented in a **bar graph**. Using a bar graph is a little different than using a picture graph to answer questions.”

“How are the ways you used a bar graph to answer questions different than how you used picture graphs?" (The bar graphs have a scale that helps you see how many are in each group without having to count each one. You really had to read the bar graphs to make sure you were counting the right thing because there weren't pictures that matched each group.)

"How are they the same?" (They both show a number in each group. You can count each picture in a picture graph and you can count each part of the bar in a bar graph.)

Suggested Centers

- How Close? (1–5), Stage 3: Add to 100 (Addressing)
- Sort and Display (1–3), Stage 1: Any Way (Supporting)

Complete Cool-Down

Response to Student Thinking

Students answer a question with an amount not represented by the graph.

Next Day Support

- During the warm-up, have students use a ruler or straightedge to line up the rectangles with the scale to help them connect the number of sections in each bar to the numbers on the scale.

Lesson 10: Represent Data Using Picture Graphs and Bar Graphs

Standards Alignments

Addressing 2.MD.D.10

Teacher-facing Learning Goals

- Explain how picture graphs, bar graphs, and tables represent the same data.
- Represent data using a picture graph and a bar graph.

Student-facing Learning Goals

- Let's make our own picture graphs and bar graphs.

Lesson Purpose

The purpose of this lesson is for students to attend to the features of picture graphs and bar graphs as they represent a given set of categorical data in picture graphs and bar graphs.

In the first activity, students are introduced to the idea of using one symbol in a picture graph rather than a picture based on the category. They may find it easier and more efficient to use a symbol when drawing their graphs. In the second activity, students attend to the features of bar graphs as they draw a bar graph to represent a given set of categorical data. The work of this lesson connects to upcoming lessons as students move from a discrete representation of numbers with the picture graph to a continuous representation of numbers with the bar graph. From there, students use bar graphs to help them understand tape diagrams in later lessons.
Students use the graphs they create in this lesson in the following lesson.

Access for:

Students with Disabilities

- Engagement (Activity 2)

Instructional Routines

MLR8 Discussion Supports (Activity 1), Which One Doesn't Belong? (Warm-up)

Materials to Gather

- Materials from a previous activity: Activity 2

Materials to Copy

- Data Tables (groups of 6): Activity 1

- Picture and Bar Graph Template (groups of 1): Activity 1
- Picture and Bar Graph Template (groups of 1): Activity 2

Lesson Timeline

Warm-up	10 min
Activity 1	20 min
Activity 2	15 min
Lesson Synthesis	10 min
Cool-down	5 min

Teacher Reflection Question

What was the best question you asked students today? Why would you consider it the best one based on what students said or did?

Cool-down (to be completed at the end of the lesson)

5 min

Fruits We Love Graphs

Standards Alignments

Addressing 2.MD.D.10

Student-facing Task Statement

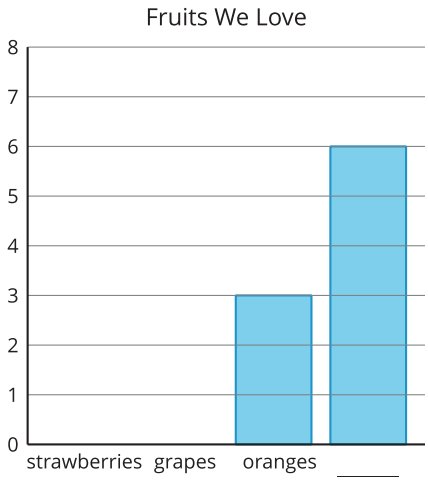
Mr. Green asked the soccer team, “What fruits do you love to eat?”

Mai and Lin used the data he collected to make graphs.
Mai started a picture graph. Lin started a bar graph.

Complete each graph.

Mai's Graph

Lin's Graph



Student Responses

Students show 6 strawberries, 5 grapes, 3 oranges, and 6 apples in each graph.

Begin Lesson

Warm-up

10 min

Which One Doesn't Belong: Data

Standards Alignments

Addressing 2.MD.D.10

The purpose of this warm-up is for students to compare four data representations. Students use and revise their language to clearly describe the features of each data representation and explain how they are the same and how they are different (MP6). Students show they understand that data represents a context when they reason about whether the graphs represent the same or different contexts (MP2). Students have seen categorical data represented in each of these ways except the horizontal bar graph. Allow students to discuss what they think of that representation.

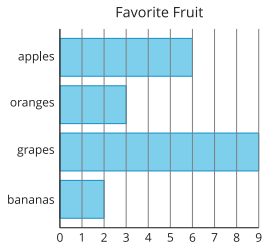
Instructional Routines

Which One Doesn't Belong?

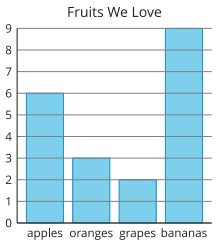
Student-facing Task Statement

Which one doesn't belong?

A



B



C

D

apples	6
oranges	3
grapes	9
bananas	2

Student Responses

- A is the only representation that isn't going up and down (vertical). It's sideways.
- B is the only representation that doesn't show a total of 2 bananas.
- C is the only representation that doesn't show a total of 3 oranges.
- D is the only representation that isn't a graph.

Launch

- Groups of 2
- Display image.
- "Pick one that doesn't belong. Be ready to share why it doesn't belong."
- 1 minute: quiet think time

Activity

- "Discuss your thinking with your partner."
- 2–3 minutes: partner discussion
- Share and record responses.

Synthesis

- "How is graph A different from other graphs we have seen? How is it the same?"

Activity 1

20 min

Draw Picture Graphs

Standards Alignments

Addressing 2.MD.D.10

The purpose of this activity is for students draw their own picture graphs to represent given data. Each student receives a data table to use. After drawing their own graphs, they share their graph with a partner and receive feedback on what is clear and what they could improve. As students represent the data and share their graphs with others, they notice and describe the features of picture graphs that make it easy for others to understand (MP3, MP6). While students are making their graphs, monitor for any features that many students leave out (for example, titles or category labels) to emphasize when sharing in the synthesis.

The data tables will be used again in the next activity.

This activity uses *MLR8 Discussion Supports*. Advances: reading, writing, and conversing.

Instructional Routines

MLR8 Discussion Supports

Materials to Copy

Data Tables (groups of 6), Picture and Bar Graph Template (groups of 1)

Required Preparation

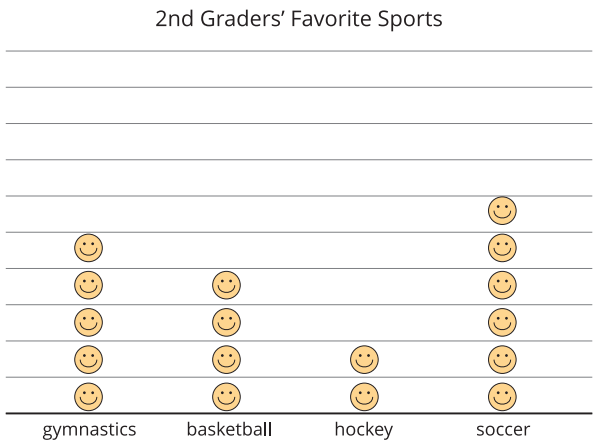
- Each student needs 1 data table from the Instructional master. Each student in a group of 2 may receive different data tables.

Student-facing Task Statement

A group of 2nd graders were asked, “What is your favorite sport?” Their responses are shown in this picture graph.

Launch

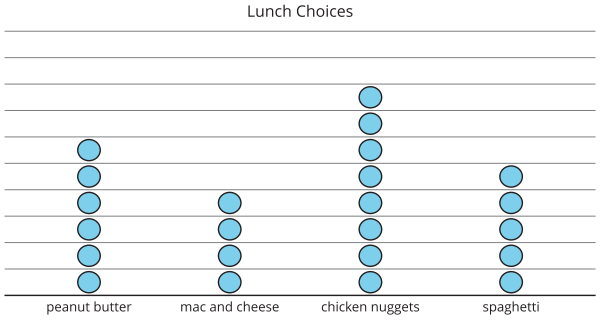
- Groups of 2
- Display “2nd Graders’ Favorite Sports” graph.
- “What can you learn about 2nd graders’ favorite sports from this graph?”
- “What are some features of this graph that help us understand the data?”
- Share responses.
- Highlight the important features (title, labels, and pictures or symbols).



Represent the data shown in your table in a picture graph.

Table # _____

Student Responses



Activity

- "Now you are going to create your own picture graph."
- Give each student 1 data table and a graph template from the Instructional master.
- "Write the number of the data table on your page."
- "This graph uses smiley faces, but you may choose something different when you make your graph."
- "Think about what picture you are going to use, then represent the data shown in your table in a picture graph."
- 10 minutes: independent work time
- Monitor for students who use symbols that are easy to draw.
- "Switch graphs with your partner."
- "Tell your partner 1 thing you think they did really well and 1 thing you still have a question about."

MLR8 Discussion Supports

- Display sentence frames.
- "You did _____ really well in your graph."
- "Why did you . . . ?"
- "Can you say more about . . . ?"
- 5 minutes: partner work time

Synthesis

- Display graphs of previously selected students.
- "What is same about these graphs? What is different?"
- 1 minute: quiet think time
- 1–2 minutes: partner discussion
- Share responses.
- Consider asking selected students:
    - "Why did you choose that symbol?"

- "What other features did you add to your graph to help others' understand it?"

Activity 2

15 min

Draw Bar Graphs

Standards Alignments

Addressing 2.MD.D.10

The purpose of this activity is for students to represent data in a bar graph. Students use the same data tables from Activity 1, but switch with a partner to make sure they have new data. In the synthesis, students revisit the similarities and differences between the features of picture graphs and bar graphs by describing what it was like to draw each type of graph. Like the previous activity, students share their graphs with others and compare the different features they include to make their data clear to others (MP3, MP6).

Access for Students with Disabilities

Engagement: Provide Access by Recruiting Interest. Use a timer to help students anticipate and prepare for transitions. A timer set for specific work time, before sharing work with a partner, will help students stay focused. When the timer is up, students will share their work.
Supports accessibility for: Attention, Organization

Materials to Gather

Materials from a previous activity

Materials to Copy

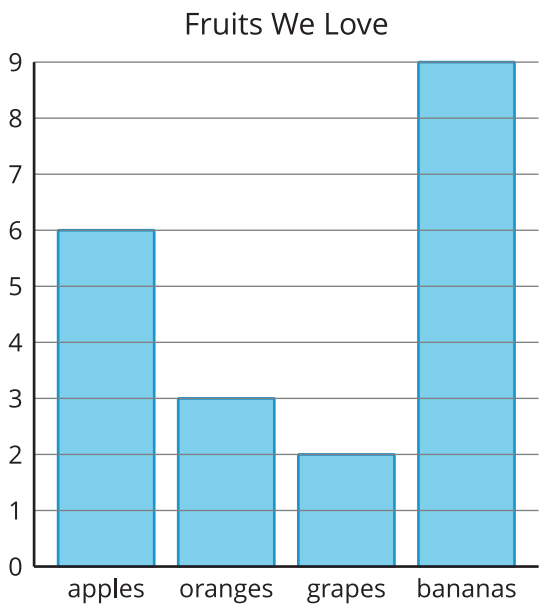
Picture and Bar Graph Template (groups of 1)

Student-facing Task Statement

A group of students were asked, “What fruit do you love to eat?” Their responses are shown in this bar graph.

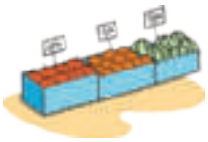
Launch

- Groups of 2
- Display “Fruits We Love” bar graph with the categories covered.
- “What do you think the labels are on the bottom? Why?”
- 2 minutes: partner discussion



Represent the data shown in your table in a bar graph.

Table # _____



Student Responses

Students' graphs vary based on their data tables. All graphs should include a title, labels, numbers on the side, and bars to represent their data.

Sample response:

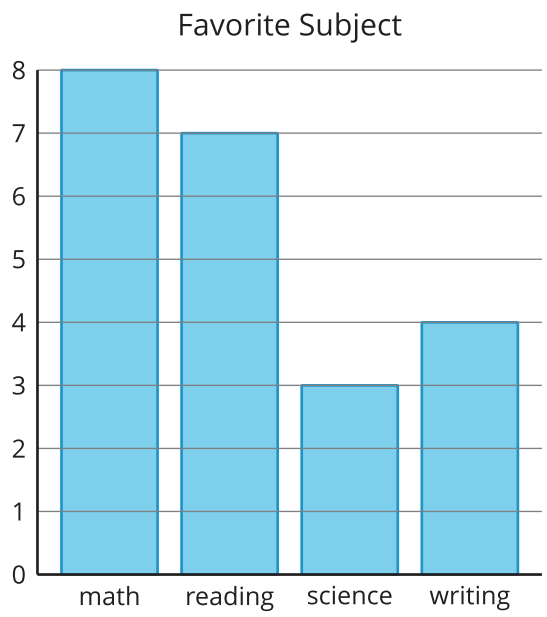
- Share and record responses.
- “What are some features of this graph that help us understand the data?”
- Share responses.
- Highlight the important features (title, labels, numbers/scale).

Activity

- Give each student a copy of the graph template.
- Prompt students to trade data tables with their partner or another student.
- “When you make your own bar graph, use the grid to draw a bar graph that represents the data in your data table.”
- “Write the number of the data table on your page.”
- “After you have made your bar graph, compare with a partner.”
- 10 minutes: independent work time

Synthesis

- “How did you know how high to make each bar in your graph?” (I knew 8 people liked math best, so I found 8 on the side and shaded in from that line down.)
- "How was drawing a bar graph like drawing a picture graph? How was it different?" (Just like picture graphs we had to use labels and titles and make sure the numbers matched. It was different because we didn't have to draw different pictures, we could just use the scale and draw towers to match. In a bar graph you have to write the numbers on the side.)



Lesson Synthesis

10 min

“Today you made picture graphs and bar graphs to represent data.“

“What is something new about graphs that you learned today?”

"What is something new that you learned from working with your partner?"

“How did you revise your graph today to make it easier for someone else to understand the data?”

“Tomorrow you will use your graphs to write questions for your classmates to answer and have the chance to answer their questions based on the graphs.”

Suggested Centers

- Shake and Spill (K–2), Stage 5: Cover (up to 20) (Addressing)
- Sort and Display (1–3), Stage 1: Any Way (Supporting)

Complete Cool-Down

Response to Student Thinking

Students complete each graph, but the data from the graphs do not match.

Next Day Support

- Launch the lesson by asking students to discuss in groups how they found the data they needed.

Lesson 11: Questions About Data

Standards Alignments

Building On	1.OA.C.6
Addressing	2.MD.D.10, 2.OA.B.2

Teacher-facing Learning Goals

- Generate and answer questions about data represented in picture graphs and bar graphs.

Student-facing Learning Goals

- Let's answer questions using picture graphs and bar graphs.

Lesson Purpose

The purpose of this lesson is for students to ask and answer questions about a given set of categorical data represented in picture and bar graphs.

In previous lessons, students interpreted picture graphs and bar graphs and answered questions using the data presented in graphs. In this lessons, students generate their own questions about the data represented in the graphs they created in the previous lesson. They use their classmates' picture graphs and bar graphs to answer student-generated questions about the data. Throughout the lesson, students have opportunities to share and revise their work with different peers. These conversations help to deepen their understanding of the structure of picture and bar graphs and the features that help clearly communicate data (MP3, MP6). When students ask their own questions and answer questions about the data, they attend to the features of the graph and the meaning of these features within the context (MP2).

This lesson has a Student Section Summary.

Access for:

Students with Disabilities

- Representation (Activity 2)

English Learners

- MLR7 (Activity 1)

Instructional Routines

Number Talk (Warm-up)

Materials to Gather

- Materials from a previous lesson: Activity 1, Activity 2

Lesson Timeline

Warm-up	10 min
Activity 1	15 min
Activity 2	20 min
Lesson Synthesis	10 min
Cool-down	5 min

Teacher Reflection Question

What aspects of today's lesson allowed each of your students to see themselves as productive mathematical reasoners?

Cool-down (to be completed at the end of the lesson) 5 min

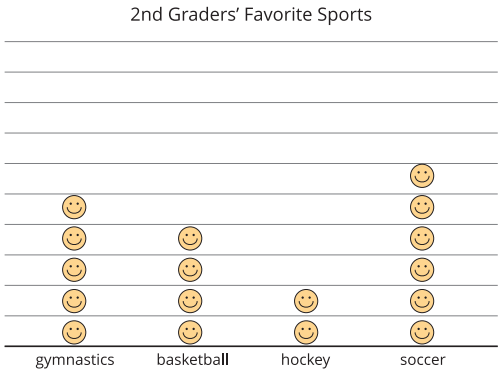
Questions About Data

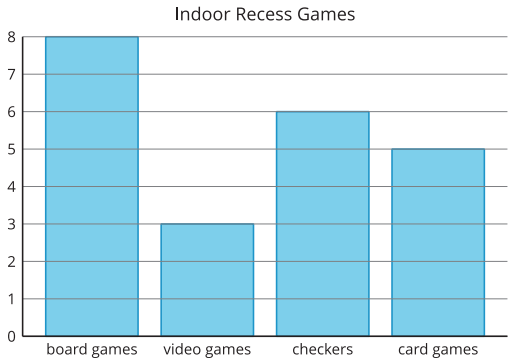
Standards Alignments

Addressing 2.MD.D.10

Student-facing Task Statement

Students were asked, "What is your favorite sport to play?" and "What indoor recess game do you like to play?" Their responses are shown in the picture graph and bar graph.





1. How many students like to play soccer? _____

2. How many students like to play board games? _____
3. Which graph was used to represent the number of students who like basketball?

   Circle one: Picture Graph Bar Graph

4. Which graph is about indoor games?

   Circle one: Picture Graph Bar Graph

Student Responses

1. 6 students like to play soccer.
2. 8 students like to play board games.
3. picture graph
4. bar graph

Begin Lesson

Warm-up

10 min

Number Talk: Make a Ten with 3 Addends

Standards Alignments

Building On	1.OA.C.6
Addressing	2.OA.B.2

The purpose of this Number Talk is to elicit the ways students use their understanding of the properties of operations and the structure of whole numbers to add within 20 (MP7). Each expression is designed to encourage students to look for ways to make a ten by looking for two addends they know make a ten or by decomposing one addend to make a ten with another. The ability to find ways to make a ten will help students develop fluency within 20 and will be helpful later in this lesson and in upcoming lessons when students add and subtract within 20.

Instructional Routines

Number Talk

Student-facing Task Statement

Find the value of each sum mentally.

- $3 + 7$
- $3 + 7 + 2$
- $5 + 7$
- $2 + 4 + 8$

Student Responses

- 10: $3 + 7 = 10$
- 12: $3 + 7 = 10$ and 2 more is 12.
- 12: I broke apart the 5 into 3 and 2. $3 + 7 = 10$ and $10 + 2 = 12$.
- 14: $2 + 8 = 10$ and $10 + 4 = 14$

Launch

- Display one expression.
- "Give me a signal when you have an answer and can explain how you got it.
- 1 minute: quiet think time

Activity

- Record answers and strategy.
- Keep expressions and work displayed.
- Repeat with each expression.

Synthesis

- "How does looking for ways to make a ten make it easier to find the values of these expressions?"

Activity 1

15 min

Write Questions Based on Graphs

Standards Alignments

Addressing 2.MD.D.10

The purpose of this activity is for students to ask questions that can be answered about a given set of categorical data represented in picture and bar graphs. Students will decide which graph can be used to answer each question, so students should be encouraged to mix up the order of the questions.

Access for English Learners

MLR7 Compare and Connect. Synthesis: Record the questions students share on a display. Ask, "What do these questions have in common? How are they different?" Amplify student responses that call attention to the language of mathematical questions.
Advances: Representing, Conversing

Materials to Gather

Materials from a previous lesson

Required Preparation

- Each student needs the picture graph and bar graph they created in the previous lesson.

Student-facing Task Statement

Write 4 questions you could ask about the data in your graphs. Make sure you have 2 for each graph.

1. _____

   _____

2. _____

   _____

3. _____

   _____

4. _____

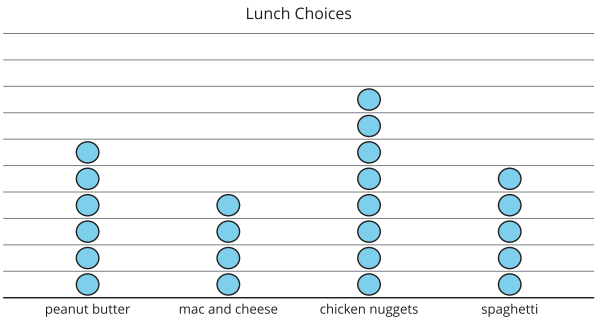
   _____

Bonus question:

_____

_____

Student Responses



1. Which lunch choice got the most votes?
2. How many people chose mac and cheese?

Launch

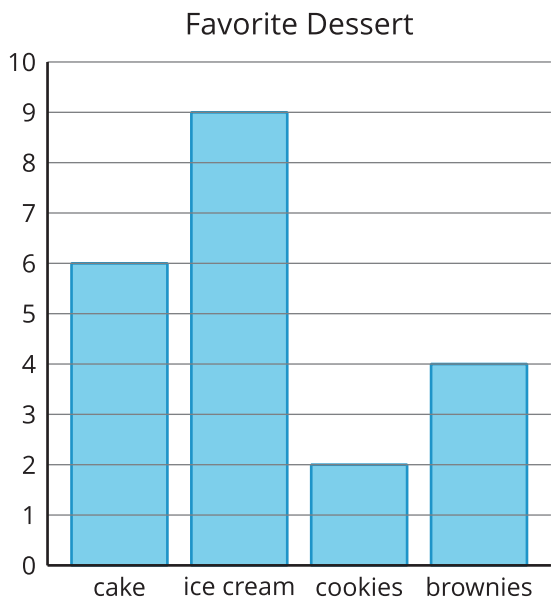
- Groups of 2
- Give each student their graphs from the previous lesson or prompt students to retrieve their graphs.

Activity

- "Now you will be writing questions that you could ask about the data in your graphs."
- "Write 2 questions for each graph, but don't put them all in order."
- "Your classmates will have to think about which graph to use to answer your questions."
- "Write at least 1 question that requires someone to combine or compare two categories."
- 8 minutes: independent work time
- Monitor for a variety of questions that students create that would require combining or comparing two or more categories.
- "Switch questions with a partner. Make sure you have questions that can be answered by the graphs."
- 4 minutes: partner discussion

Synthesis

- Invite previously identified students to share the questions that they created that would require combining or comparing two more more categories.



3. How many more students like ice cream than cookies?
4. What is the total number of students who like brownies or cake best?

- "How do you know these questions will require someone to combine or compare the totals of two or more categories?" (The questions ask about two or more categories. It doesn't just ask to tell how many are in one category or which category had the most. I see words like "how many more" or "how many less.")
- “If you would like, you can revise your questions or add a bonus question.”

Advancing Student Thinking

If students only write questions that ask others to answer how many are in a category, consider asking:

- "How many categories would someone need to look at to answer your question(s)?"
- "What is a question you could write that asks someone to compare two categories on your graph?"
- "What is a question you could write that asks someone to find the total of two or more categories on your graph?"

Activity 2

20 min

Answer Questions Using Graphs

Standards Alignments

Addressing 2.MD.D.10

The purpose of this activity is for students to answer questions about the data represented by their picture graphs and bar graphs. Students switch workbooks with a new partner, which is an opportunity for students to view each other's work and see different representations of data. While students are answering questions based on different graphs, identify the questions that are harder for students to answer. These questions can be discussed in the lesson synthesis. In upcoming lessons, students will have more opportunities to work with questions that require comparing categories.

Access for Students with Disabilities

Representation: Internalize Comprehension. Synthesis: Invite students to identify which details were important or most useful to pay attention to. Display the sentence frame, "The next time I answer questions about a graph, I will . . . ."
Supports accessibility for: Conceptual Processing, Memory

Materials to Gather

Materials from a previous lesson

Required Preparation

- Each student needs the picture graph and bar graph they created in the previous lesson.

Student-facing Task Statement

Answer your partner's questions from Activity 1 using the graphs.

1. _____

   _____

2. _____

   _____

3. _____

   _____

4. _____

Launch

- Groups of 2: different partner than previous activity
- "Tear out the page in your books labeled 'Answering Questions Using Graphs.'"

Activity

- "Now you are going to answer questions a different partner has written about their graphs."
- "Write your name and your partner's name on the top of the page."
- "Trade graphs and questions with your

_____

5. How did you know where to find the answer to each question?

_____

_____

Student Responses

Answers vary. Sample responses:

- 7 more students like ice cream than cookies.
- 4 people chose mac and cheese.
- 10 students like brownies or cake best.
- Chicken nuggets got the most votes.

partner. Answer each of the questions your partner wrote."

- 6 minutes: independent work time
- "Discuss the questions and answers with your partner to see if you agree."
- 6 minutes: partner discussion
- Monitor for students who mention the graph features like the title or labels when answering, "How did you know where to find the answer to each question?"

Synthesis

- Select 2–3 identified students to share a question they answered and how they knew where to find the answer.

Lesson Synthesis

10 min

"Today you asked and answered questions based on data represented in picture graphs and bar graphs."

"What kinds of questions were easier to answer? Which kinds of questions were more difficult to answer?"

"Where did you look on each graph to find the answers to questions?"

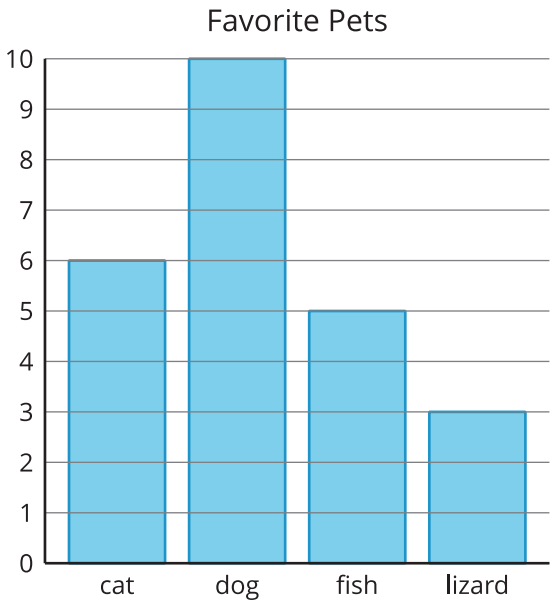
Suggested Centers

- Shake and Spill (K–2), Stage 5: Cover (up to 20) (Addressing)
- Sort and Display (1–3), Stage 1: Any Way (Supporting)

Student Section Summary

In this section we represented **data** in picture graphs and bar graphs and used them to answer questions.

A **picture graph** is an organized way to share data using pictures of the objects.



A **bar graph** is an organized way to share data using the height or length of rectangles to show how many in each category or group.

We can use these graphs to answer the questions below.

1. How many students chose a dog?
2. How many more students chose cats than chose lizards?
3. How many students voted for their favorite pet?

Complete Cool-Down

Response to Student Thinking

Students incorrectly answer either the bar graph or picture graph questions.

Next Day Support

- During the warm-up of the next lesson, have students practice asking and answering questions using the graph from the cool down.

Lesson 12: Center Day 2 (Optional)

Standards Alignments

Addressing 2.MD.D.10, 2.NBT.B.5, 2.OA.B.2

Teacher-facing Learning Goals

- Practice adding and subtracting within 10 or 20.
- Practice adding within 50.
- Represent data using picture and bar graphs.

Student-facing Learning Goals

- Let's sort a collection and make graphs to represent it.

Lesson Purpose

The purpose of this lesson is for students to practice organizing data and using graphs to represent it. Students also practice adding and subtracting within 10, 20, or 50.

This lesson is optional because it is an opportunity for extra practice that not all classes may need. In Activity 1, students learn stage 2 of the Sort and Display center, which was first introduced in grade 1. In this new stage, called Picture or Bar Graphs, students sort 20–30 objects into 3 categories and make a picture or bar graph that shows how they sorted. In Activity 2, students choose between two previously introduced centers focused addition and subtraction.

Instructional Routines

Number Talk (Warm-up)

Materials to Gather

- Collections of objects: Activity 1

Materials to Copy

- Sort and Display Stage 2 Recording Sheet (groups of 1): Activity 1

Lesson Timeline

Warm-up	10 min
Activity 1	20 min
Activity 2	20 min
Lesson Synthesis	10 min

Teacher Reflection Question

Reflect on how comfortable your students are asking questions of you and of each other. What can you do to encourage students to ask questions?

Begin Lesson

Warm-up

10 min

Number Talk: Differences

Standards Alignments

Addressing 2.NBT.B.5

The purpose of this Number Talk is to elicit strategies and understandings students have for subtracting a one-digit number from a two-digit number by using a ten. When students decompose a number to lead to a ten, they look for and make use of the structure of whole numbers and the properties of operations (MP7).

Instructional Routines

Number Talk

Student-facing Task Statement

Find the value of each expression mentally.

- $17 - 7$
- $17 - 9$
- $15 - 5$
- $15 - 8$

Student Responses

- 10: 17 is 1 ten and 7 ones, so I took away the ones.
- 8: I knew that $17 - 7 = 10$, and then I took away 2 more.
- 10: I know that $10 + 5$ is 15, so I took away the 5.
- 7: I took 5 away and counted back 3 more.

Launch

- Display one expression.
- "Give me a signal when you have an answer and can explain how you got it."
- 1 minute: quiet think time

Activity

- Record answers and strategy.
- Keep expressions and work displayed.
- Repeat with each expression.

Synthesis

- "How can we use the first expression to find the value of the second one?" (I knew that $17 - 7 = 10$, and then I took away 2 more.)

Activity 1

20 min

Revisit Sort and Display

Standards Alignments

Addressing 2.MD.D.10

The purpose of this activity is for students to learn stage 2 of the Sort and Display center. Students sort 20–30 objects into 3 categories and make a picture or bar graph that shows how they sorted. Then, they ask their partner 2 questions that can be answered based on their graph. Students are given an opportunity to sort items, represent how they sorted, and create questions that can be asked about the data in their representation (MP2, MP6).

To connect this center to English Language Arts, students could use books to find a collection. Students look at the cover of a book and choose 3 words or 3 images they think will show up most often in the story and explain why to their partner. Partners record these choices as initial categories. Students then read or look through the book together, explore their prediction and decide together if they want to revise their categories based on what they've read. On the second read, they collect and record data for their revised categories. Lastly students create representations based on their data and write 2 "How many?" questions that can be asked about the data in their representations.

Materials to Gather

Collections of objects

Materials to Copy

Sort and Display Stage 2 Recording Sheet (groups of 1)

Required Preparation

- Each group of 2 needs a collection of 20–30 objects that could be sorted into at least 3 categories. Examples: pattern blocks, cubes, sets of books, or a combination of blocks, cubes, and counters.

Launch

- Groups of 2
- Give each student a recording sheet.
- "There is a new center called "Sort and Display."
- Read directions aloud to students.

- "Choose a collection to sort. Sort into 3 categories. Represent the data in a graph that shows how many are in each category."
- "After you've made your representation, you and a partner should ask each other questions about the data in your graph."

Activity

- 12–15 minutes: partner work time
- Monitor for 1–2 graphs to share in the activity synthesis.

Synthesis

- Display student representation.
- "What questions can we ask about the representation of how they sorted?"

Activity 2

20 min

Centers Choice Time

Standards Alignments

Addressing 2.NBT.B.5, 2.OA.B.2

The purpose of this activity is for students to choose from activities that focus on adding or subtracting.

Students choose from any stage of previously introduced centers.

- What's Behind My Back?
- How Close?
- Number Puzzles

Required Preparation

Gather materials from :

- What's Behind My Back, Stages 2 and 3
- How Close, Stages 1–3
- Number Puzzles, Stages 1 and 2

Student-facing Task Statement

Choose a center.

What's Behind My Back?

How Close?

$\square\ \square + \square\ \square = ____$

Number Puzzles

$14 = 8 + \square$

Launch

- "Now you will choose from centers we have already learned that focus on adding and subtracting."
- Display the center choices in the student book.
- "Think about what you would like to do first."
- 30 seconds: quiet think time

Activity

- Invite students to work at the center of their choice.
- 15 minutes: center work time

Synthesis

- "Which activity did you choose? What did you like about the activity you chose?"

Lesson Synthesis

10 min

"Today we chose activities to work on and worked with a partner during center time."

Math Community

Display chart from previous lesson and read the norms to students.

"What went well? What can we continue to work on?"

Section C: Diagrams to Compare

Lesson 13: Use Bar Graphs to Compare

Standards Alignments

Addressing 2.MD.D.10, 2.OA.B.2

Teacher-facing Learning Goals

- Solve Compare problems with an unknown difference within 20.
- Write equations to represent Compare problems.

Student-facing Learning Goals

- Let's use bar graphs to solve Compare problems.

Lesson Purpose

The purpose of this lesson is for students to make sense of and solve Compare problems using the structure of a bar graph and equations.

In grade 1, students use the relationship between addition and subtraction to solve and represent Compare problems. They create diagrams and write equations to represent how they think about the quantities within the Compare problems. In this lesson, students interpret bar graphs and use their visual structure to compare quantities. They write equations to represent comparisons and connect these equations to the structure of the bar graph (MP2). In upcoming lessons, students will use bar graphs to make sense of tape diagrams that represent Compare problems.

Access for:

Students with Disabilities

- Representation (Activity 2)

English Learners

- MLR8 (Activity 1)

Instructional Routines

True or False (Warm-up)

Lesson Timeline

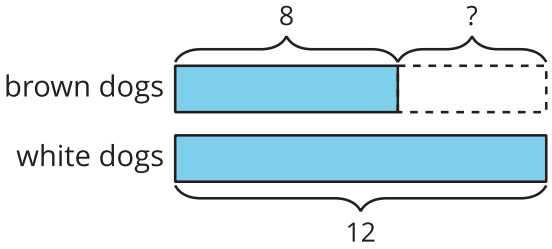
Warm-up	10 min

Teacher Reflection Question

In future lessons, students will make sense of

Activity 1	15 min
Activity 2	20 min
Lesson Synthesis	10 min
Cool-down	5 min

tape diagrams to represent Compare problems.



How does the work with the bar graphs today help build students' understanding of this more abstract diagram?

Cool-down (to be completed at the end of the lesson)

5 min

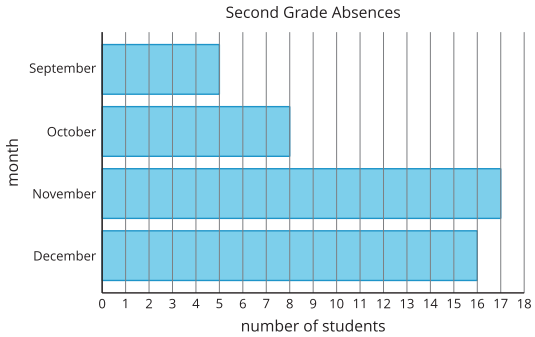
Second Grade Absences

Standards Alignments

Addressing 2.MD.D.10

Student-facing Task Statement

The school collected attendance data to see how many second graders were absent each month from September to December. The data is shown in this bar graph.



1. How many fewer students were absent in October than in November? Show your thinking using drawings, numbers, or words.
2. Write an equation to show how you found the difference. Can you write another equation that shows how to find the difference?

Student Responses

1. 9 fewer students were absent in October than November. Sample responses:
   - First break apart 8 into 7 and 1. Then subtract $17 - 7 = 10$ and $10 - 1 = 9$.
   - Student shows counting on from 8 to 17 and labeling 9 fewer students.
2. Sample responses:
   - $17 - 8 = 9$
   - $8 + 9 = 17$
   - $8 + ? = 17$

Begin Lesson

Warm-up

10 min

True or False: Make Ten with 9

Standards Alignments

Addressing 2.OA.B.2

The purpose of this warm-up is to activate students' previous experiences in which they looked for ways to make a ten—specifically, when one addend is 9. The ability to make a ten will help students develop fluency within 20 and will be helpful later in this lesson and in upcoming lessons when students add and subtract within 20.

When students look for ways to make a ten and notice similarities in the addends and values in each of the expressions, they look for and make use of the structure of whole numbers and the properties of operations (MP7).

Instructional Routines

True or False

Student-facing Task Statement

Decide if each statement is true or false. Be prepared to explain your reasoning.

Launch

- Display one statement.

- $9 + 4 = 9 + 1 + 3$
- $9 + 4 = 10 + 3$
- $9 + 5 = 10 + 6$

Student Responses

- True: both sides have 9 and 4, because 4 can be broken into $1 + 3$.
- True: if I take 1 from the 4 and give it to the 9, then I have 10 and 3, which is what is on the other side.
- False: if I want to make a 10, I need to take 1 from the 5 and give it to the 9. That would make a 10, but then there would only be 4 left. So it would be $10 + 4$ and $10 + 6$, and they aren't the same.
- "Give me a signal when you know whether the statement is true and can explain how you know."
- 1 minute: quiet think time

Activity

- Share and record answers and strategy.
- Repeat with each statement.

Synthesis

- "How can you justify your answer without adding?" (I see that 9 + 4 and 9 + 1 + 3 are the same because 1 + 3 = 4.)

Activity 1

15 min

What's the Difference?

Standards Alignments

Addressing 2.MD.D.10

The purpose of this activity is for students to use a bar graph to compare two quantities and describe the methods they use to find the unknown difference. Monitor for students who draw on the graph and describe ways of finding the difference by counting on or counting back. If students draw on their graph or do not discuss both counting methods during the activity, create and display work so that each method can be discussed during the synthesis. The discrete segments of the bar graph are used to elicit these counting methods (MP5), however, some students may use addition or subtraction, including known sums, to find the difference. Encourage these students to connect their methods to the counting methods shared in the synthesis.

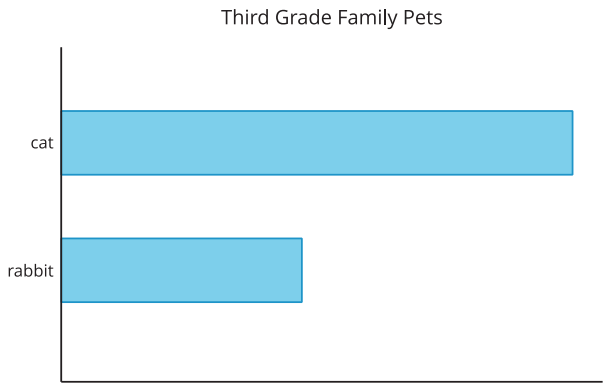
Access for English Learners

MLR8 Discussion Supports. Provide all students with an opportunity to speak and to practice using comparison statements. Invite students to chorally repeat statements that use "more" and "fewer" in unison 1–2 times.
Advances: Speaking, Listening

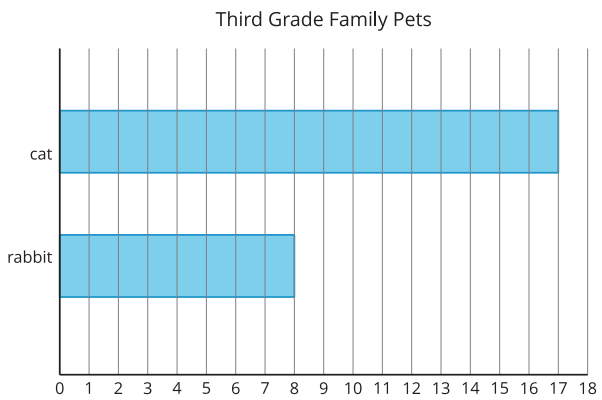
Student-facing Task Statement

A group of third grade students were asked, "What pets do you have?" Their responses are shown in the bar graph.

What do you notice? What do you wonder?



Their responses are also shown in this bar graph.



How many more students have cats than have rabbits? Show two ways to find the difference.

Student Responses

9. Sample responses:

- Students show or describe counting on from 8 to 17 on the graph ($8+? = 17$, $8 + 9 = 17$).
- Students show or describe counting back

Launch

- Groups of 2
- Display the image (graph with no scale).
- “A group of third grade students were asked, ‘What pets do you have?’ Their responses are shown in the bar graph."
- "What do you notice about the data in the graph? What do you wonder?”
- 1 minute: quiet think time
- 1 minute: partner discussion
- Monitor for students to say: “More students have cats than have rabbits,” or wonder, “How many more students have cats than have rabbits?”
- Share and record student responses.
- If students do not make statements using “more” or “fewer,” display:
- “There are more _____ than _____.”
- “There are fewer _____ than _____.”
- “How could you complete the sentences to make them true statements about the graph?”
- 1 minute: quiet think time
- 1 minute: partner discussion
- Share responses.

Activity

- “You noticed that more students have cats than have rabbits. Your job now is to figure out how many more students have cats than have rabbits. Think about two different ways you can find the answer and record them.”
- 3–4 minutes: independent work time
- 2–3 minutes: partner discussion
- Monitor for a student who uses a counting on method and a student who uses a

from 17 to 8 on the graph ($17 - ? = 8$, $17 - 9 = 8$).

counting back method.

Synthesis

- Invite previously identified students to share how they found the difference. If methods are only explained verbally, consider asking, “Can you show us on the bar graph how you could count on (or count back) to find how many more?”
- Record student methods with an equation. For example, for students who describe counting on, write “8 + 9 = 17.”
- "How are their methods similar? How are their methods different?" (One method starts with the smaller number of pets and counts on to the larger number, like adding 9 more. The other starts with the larger number of pets and counts back to the smaller number, like subtracting 9.)

Activity 2

20 min

Dogs in the Park

Standards Alignments

Addressing 2.MD.D.10

The purpose of this activity is for students to use graphs to make comparison statements and solve Compare problems. Students represent their comparisons with equations. In the synthesis, students connect the graph, their comparison statements, and their equations.

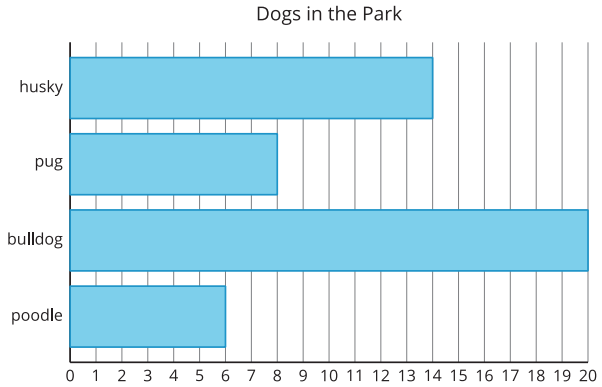
When students describe how they see their equations in the graph and how their equations relate to the context, they think abstractly and quantitatively (MP2).

Access for Students with Disabilities

Representation: Access for Perception. Display information in a flexible format to facilitate comparisons. Create a display of the graph with detachable bars, so that types of dogs that do not appear next to each other in the original graph can be more easily compared. For example, number of poodles and number of pugs.
Supports accessibility for: Visual-Spatial Processing, Conceptual Processing

Student-facing Task Statement

Kiran and Lin counted the types of dogs they saw in a park. Their data is shown in the bar graph.



1. Make this statement true: There are more _____ than _____.
2. Write an addition and a subtraction equation to show how many more.
3. Make this statement true: There are fewer _____ than _____.
4. Write an addition and subtraction equation to show how many fewer.

Student Responses

1. Sample response: There are more bulldogs than huskies.

Launch

- Groups of 2
- Display the Dogs in the Park graph.
- "What statement can you make that compares the number of huskies to the number of bulldogs?" (There are more bulldogs than huskies. There are fewer huskies than bulldogs. There are 6 more bulldogs than huskies.)
- 1 minute: partner discussion
- 1 minute: whole-class discussion
- Share statements that use "more" and "fewer."

Activity

- "Now you are going to write some statements using 'more' and 'fewer' and write equations to show how to find the difference."
- 5 minutes: independent work time
- "Now check with your partner. Are their statements true?"
- 3 minutes: partner discussion
- Monitor for different equations students use for each comparison.

Synthesis

- Invite 1–2 previously identified students to share their statements using fewer and

2. Sample response: 6 more. $20 - 14 = 6$, $14 + 6 = 20$
3. Sample response: There are fewer poodles than pugs.
4. Sample response: $8 - 6 = 2$, $6 + 2 = 8$

one equation. (Sample response: There are fewer pugs than bulldogs. There are 12 fewer. 8 + 12 = 20)

- Record equation.
- “What other equations could we write to show how many fewer for _____’s statement?” (Sample response: We could use subtraction. 20 – 12 = 8 shows you can count back 12 from 20 to get to 8.)
- Record equations.
- For each equation, ask, “What does each number represent in the equation?” (20 represents the number of bulldogs. 8 represents the number of pugs. 12 represents how many fewer pugs.)

Advancing Student Thinking

If students write statements that are not true, consider asking:

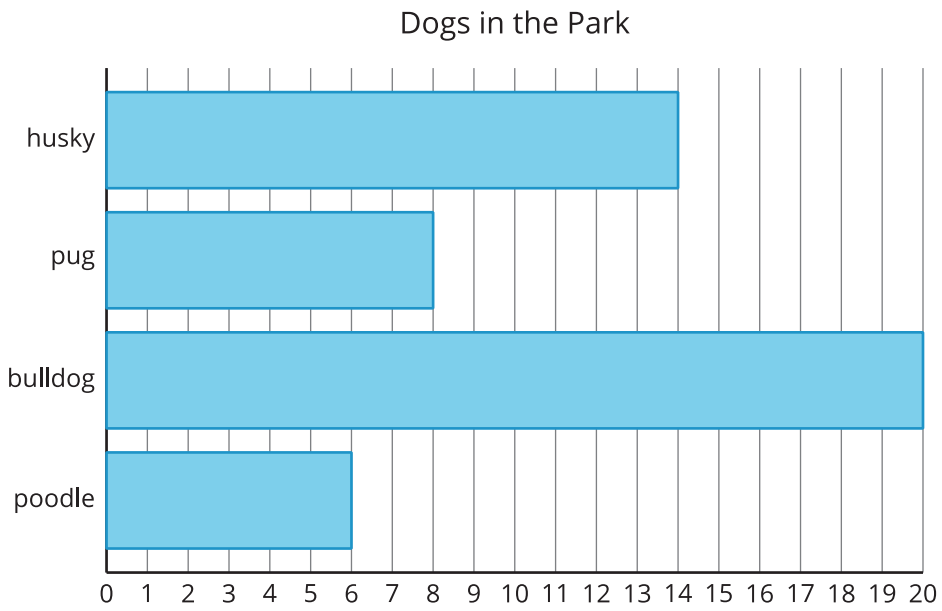
- "How did you decide which group had fewer?"
- "Where do you see this on the graph?"

Lesson Synthesis

10 min

“Today, we learned that there are different ways we can talk about comparisons and write equations to represent them.”

Display graph from Activity 2.



Display: $14 + 6 = 20$

"6 is the answer. What is the question?" (Sample response: How many more bulldogs are there than huskies?")

Consider asking: "How did you use the graph? What did you look for?"

If time permits (or if $14 + 6 = 20$ was discussed in Activity 2 Synthesis):

Display: $8 - 2 = 6$

"2 is the answer. What is the question?" (Sample response: How many fewer poodles are there than pugs?)

Consider asking: "How did you use the graph? What did you look for?"

Suggested Centers

- Sort and Display (1–3), Stage 2: Picture or Bar Graphs (Addressing)
- Shake and Spill (K–2), Stage 5: Cover (up to 20) (Supporting)

Complete Cool-Down

Response to Student Thinking

Students can write 1 equation, but not yet 2.

Next Day Support

- During the launch of the first activity in the next lesson, have students brainstorm with a partner all the equations that could represent the value.

Lesson 14: Use Diagrams to Compare

Standards Alignments

Addressing	2.MD.D.10
Building Towards	2.OA.A.1

Teacher-facing Learning Goals

- Solve Compare problems with an unknown difference within 20.
- Use understanding of bar graphs to make sense of tape diagrams.

Student-facing Learning Goals

- Let's use bar graphs and diagrams to solve Compare problems.

Lesson Purpose

The purpose of this lesson is for students to use their understanding of bar graphs to interpret tape diagrams and solve Compare problems with the difference unknown within 20.

In this lesson, students use their understanding of bar graphs to make sense of a new representation, the tape diagram. The tape diagram is a representation that can be used by students to represent story problems. Students will use tape diagrams in grade 2 and throughout elementary, middle, and high school.

Access for:

Students with Disabilities

- Action and Expression (Activity 1)

English Learners

- MLR2 (Activity 1)

Instructional Routines

Notice and Wonder (Warm-up)

Materials to Gather

- Glue or tape: Activity 1
- Scissors: Activity 1

Materials to Copy

- Party Time (groups of 1): Activity 1

Lesson Timeline

Warm-up	10 min
Activity 1	20 min
Activity 2	15 min
Lesson Synthesis	10 min
Cool-down	5 min

Teacher Reflection Question

The relationship between addition and subtraction is important as students develop fluency within 20 in grade 2. How did you use the tape diagram to help students build this understanding?

Cool-down (to be completed at the end of the lesson)

5 min

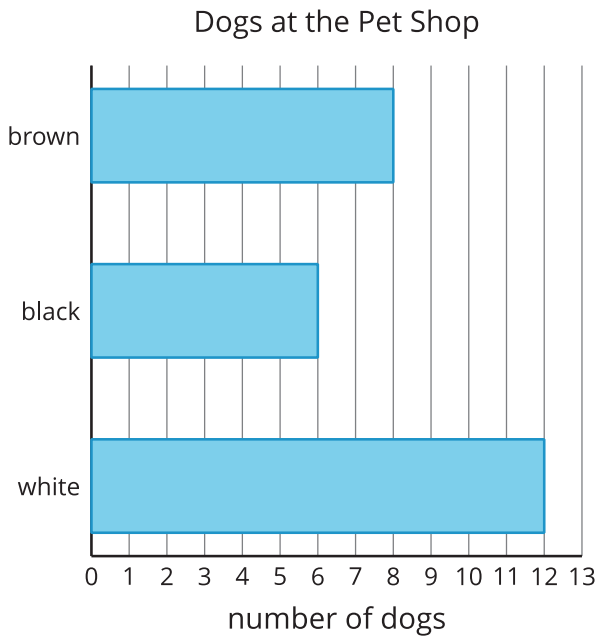
Dogs at the Pet Shop

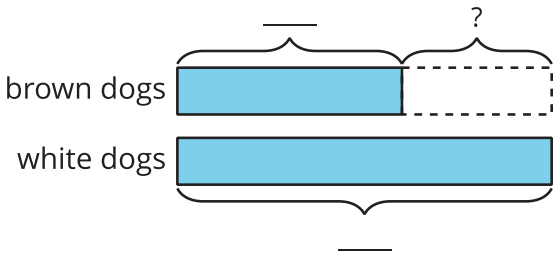
Standards Alignments

Addressing 2.MD.D.10

Student-facing Task Statement

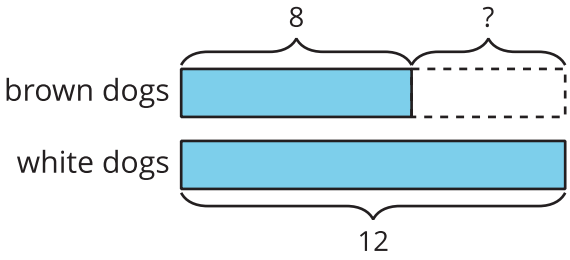
These two representations show the same data about dogs at a pet store.





1. Use the bar graph to fill in the boxes on the diagram.
2. How many more white dogs than brown dogs are there? Show your thinking using drawings, numbers, or words.

Student Responses



1.
2. Sample response: There are 4 more white dogs than brown dogs. $8 + 4 = 12$

Begin Lesson

Warm-up

10 min

Notice and Wonder: What Kind of Graph Is This?

Standards Alignments

Addressing 2.MD.D.10

The purpose of this warm-up is to elicit the idea that tape diagrams are similar to bar graphs and can be used to represent the same data, which will be useful as students make sense of the tape diagram throughout this section. While students may notice and wonder many things about these images, recognizing that tape diagrams can show comparisons like a bar graph is the important discussion point.

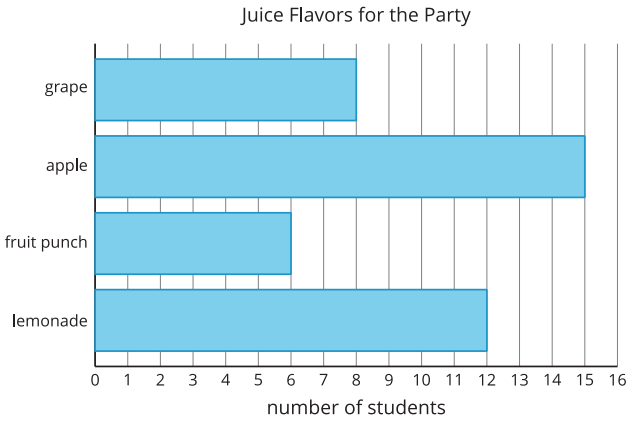
When students make connections between the different ways the representations represent the same categories and quantities, they reason abstractly and quantitatively and look for and make use of structure (MP2, MP7).

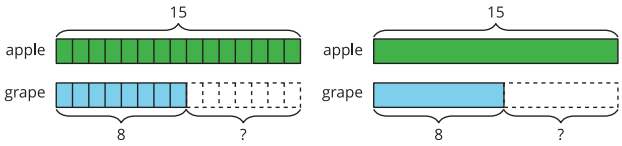
Instructional Routines

Notice and Wonder

Student-facing Task Statement

What do you notice? What do you wonder?





Student Responses

Students may notice:

- All of them have apple and grape.
- The numbers are the same.
- The ones at the bottom don't have all the bars.

Students may wonder:

- Why don't the two at the bottom have all the flavors?
- Is this a new kind of graph?
- Why is there one with no sections?

Launch

- Groups of 2
- Display the image.
- "What do you notice? What do you wonder?"
- 1 minute: quiet think time

Activity

- "Discuss your thinking with your partner."
- 1 minute: partner discussion
- Share and record responses.

Synthesis

- "The 2 images at the bottom are called diagrams."
- "What do you think the 15 and 8 represent in the diagrams at the bottom?" (Its how many students that picked apple juice and how many students picked grape juice.)
- "What does the question mark in the diagram represent?" (The difference between the number of students that picked apple juice and grape juice, how many more students picked apple juice than grape juice, how many fewer students picked grape juice than apple juice.)

Activity 1

20 min

Party Time (Part 1)

PLC Activity

Standards Alignments

Addressing	2.MD.D.10
Building Towards	2.OA.A.1

The purpose of this activity is for students to use their understanding of bar graphs to make sense of tape diagrams. Students physically create a tape diagram from a bar graph and compare two of the categories. Students recognize that even without a given scale, they can use this visual structure to compare amounts and reason about the difference between the two (MP2).

Students revisit the meaning of a diagram—a drawing or picture that represents quantities.

Access for English Learners

MLR2 Collect and Display. Collect the language students use as they make comparison statements. Display words and phrases used to compare data such as “fewer,” “less,” “least,” “greater,” “more,” and “most.” During the synthesis, invite students to suggest ways to update the list: “What are some other comparison words or phrases we should include?” Invite students to borrow language from the display as needed.
Advances: Conversing, Reading

Access for Students with Disabilities

Action and Expression: Provide Access for Physical Action. Provide access to pre-cut materials to reduce barriers for students who need support with fine-motor skills and students who benefit from extra processing time.
Supports accessibility for: Fine Motor Skills, Organization, Visual-Spatial Processing

Materials to Gather

Glue or tape, Scissors

Materials to Copy

Party Time (groups of 1)

Student-facing Task Statement

1. Glue down the two bars that compare the number of students who picked hot dogs to the number who picked burgers.

Launch

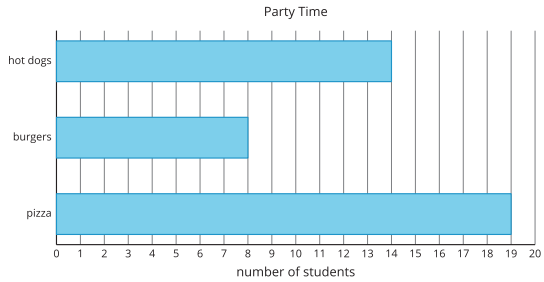
- Groups of 3–4
- Display the Party Time bar graph from the Instructional master.

2. Write two statements that compare the number of students who picked hot dogs to the number who picked burgers.

Student Responses

1. Sample response:

2. Sample response:
   - There are more hot dogs than burgers.
   - There are fewer burgers than hot dogs



- "What can we learn from this graph?"
- Share responses.
- "A soccer team is having a party. The coach asked the players if they would like hot dogs, burgers, or pizza. Their responses are shown in this bar graph."
- Give each student a copy of the Instructional master, scissors, and tape or glue.

Activity

- "Cut out each of the bars in the graph and put the strips next to each other. What comparison statements can you make about the bars?"
- 5 minutes: small-group work time
- "What comparison statements did you make about the data? Did anyone get confused about what each bar represented? Did anyone get confused about how many are in each bar?"
- 3–4 minutes: class discussion
- "We can use the bars to make a diagram, like the one we saw in the warm-up. A diagram can be used to help us represent and compare quantities. Just like graphs, diagrams need labels so we can understand what they represent. Use your bars to create a diagram to compare the number of students who wanted hot dogs to those who wanted burgers. When you're done, write two different statements that compare hot dogs to burgers."
- 5 minutes: independent work time

- Monitor for students who label the categories and quantities.

Synthesis

- Display a student's completed tape diagram.
- "How does your diagram make it easy to see which food received the most votes?" (We wrote labels to show which bar matches which food.)
- "What do you need to add to the bars to answer questions like 'How many more students chose hot dogs than burgers?'" (Label what number the bar represents.)
- 1 minute: quiet think time
- 1 minute: partner discussion
- Share responses.
- As needed, draw a diagram that resembles the tape diagram in the warm-up.
- "Diagrams can help represent Compare problems. You can use rectangles like the bars in a bar graph to represent the bigger amount, the smaller amount, and the difference."

Advancing Student Thinking

If students label the diagram incorrectly, consider asking:

- "How does this diagram show the greater value?"
- "Where do you see the difference between the values in the diagram?"

Activity 2

15 min

Party Time (Part 2)

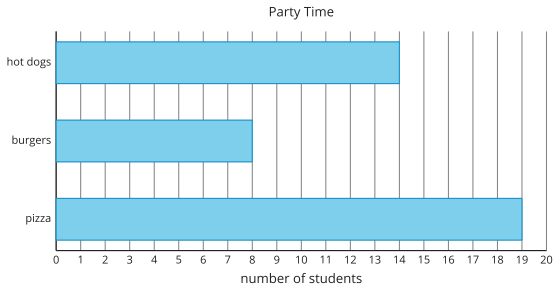
Standards Alignments

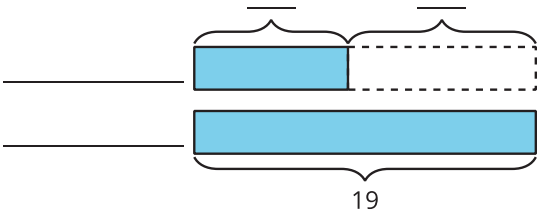
Building Towards 2.OA.A.1

The purpose of this activity is for students to complete a tape diagram and describe the features of tape diagrams. Throughout the activity, students use what they know about bar graphs to make sense of what each number in a tape diagram represents and the role of the question mark. They also connect the structure of the tape diagram to equations that represent a comparison of two quantities (MP2). As students connect the labels on the tape diagram to the question, the features on the graph, and the context, they attend to precision and reason abstractly and quantitatively (MP6).

Student-facing Task Statement

1. Use the data from the bar graph to complete the diagram.





2. How many more students chose pizza than chose burgers? Write an equation to show how you found the difference.
3. Use the data from the bar graph to complete the diagram.

Launch

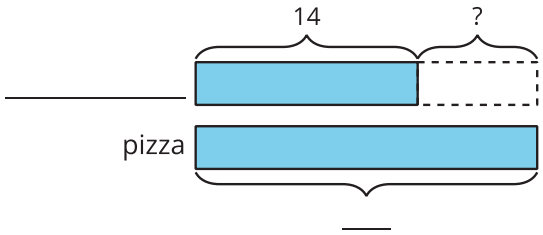
- Groups of 2

Activity

- "Now you are going to use the data from the Party Time graph to complete some more diagrams."
- 3 minutes: quiet work time
- 6 minutes: partner discussion

Synthesis

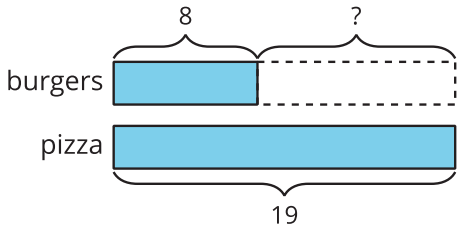
- "How did you figure out what food was being compared to pizza?" (We looked for the food that was picked by 14 students.)
- "What does the question mark represent in the diagram?" (It shows the difference between hot dogs and pizza. It shows how many more students would need to pick hot dogs to be the same as the number of students who picked pizza.)
- Point out the dashes representing the difference, but not an actual quantity.
- "What equation could we write to represent this difference?" ($19 - ? = 14$, $14 + ? = 19$)
- Record responses.



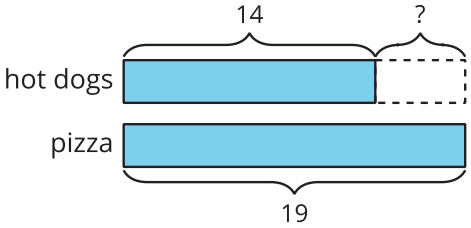
4. Write a statement that compares the student votes in the diagram.

Student Responses

1. Labels tape diagram to match the graph.



2. $19 - 8 = 11$ or $8 + 11 = 19$. 11 more players chose pizza than burgers. Sample response: $8 + (2 + 9) = 19$ so $(8 + 2) + 9 = 19$

3. 

4. More students chose pizza than hot dogs.

- "How do you see each number represented in the diagram?" (19 shows how many picked pizza, 14 shows how many picked hot dogs. The question mark shows the difference.)

Advancing Student Thinking

If the student assigns the larger value to the smaller part or places the question mark in a place other than the difference, consider asking:

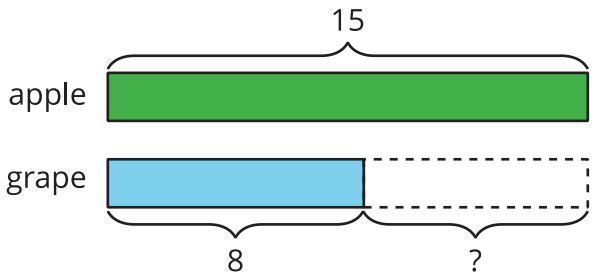
- "Can you explain your representation to me?"
- "How can you use the bar graph to help you label the diagram?

Lesson Synthesis

10 min

"Today, we learned about diagrams that can represent problems in which we compare two amounts."

Display tape diagram from warm-up:



"Tell your partner a story that is represented by this diagram." (Sample response: Eight students voted for grape juice. 15 students voted for apple juice. How many more students voted for apple juice?)

Suggested Centers

- Sort and Display (1–3), Stage 2: Picture or Bar Graphs (Addressing)
- Shake and Spill (K–2), Stage 5: Cover (up to 20) (Supporting)

Complete Cool-Down

Response to Student Thinking

Students find the correct difference, but label the tape diagram inaccurately.

Next Day Support

- Launch Activity 1 with a discussion about this cool-down.

Lesson 15: Diagrams with All Kinds of Compare Problems

Standards Alignments

Addressing 2.OA.A.1, 2.OA.B.2

Teacher-facing Learning Goals

- Interpret tape diagrams that represent Compare problems, with unknowns in all positions within 100.

Student-facing Learning Goals

- Let's connect Compare problems to diagrams.

Lesson Purpose

The purpose of this lesson is for students to connect Compare problems with unknowns in all positions to tape diagrams.

In this lesson, students continue to make sense of tape diagrams as they connect them to story problems. The story problems in this lesson include Compare problems with an unknown difference, an unknown larger number, or an unknown smaller number. Because these problem types are familiar from grade 1, students also begin to work with numbers within 100 in this lesson. This gives students an opportunity to notice how the tape diagram can be used to quickly visualize story problems with larger quantities. Students use tape diagrams to make sense of Compare problems. When students connect situations, tape diagrams, and equations, they deepen their understanding of the problem type and develop strategies they can use to make sense of and persevere in solving these problems in future lessons (MP1, MP2).

Access for:

Students with Disabilities

- Action and Expression (Activity 1)

English Learners

- MLR8 (Activity 2)

Instructional Routines

Card Sort (Activity 2), Number Talk (Warm-up)

Materials to Copy

- Card Sort: At the Beach (groups of 2): Activity

2

Lesson Timeline

Warm-up	10 min
Activity 1	15 min
Activity 2	20 min
Lesson Synthesis	10 min
Cool-down	5 min

Teacher Reflection Question

As students worked in their small groups today, whose ideas were heard, valued, and accepted? How can you adjust the group structure in future lessons to ensure each student's ideas are a part of the collective learning?

Cool-down (to be completed at the end of the lesson) 5 min

At the Beach

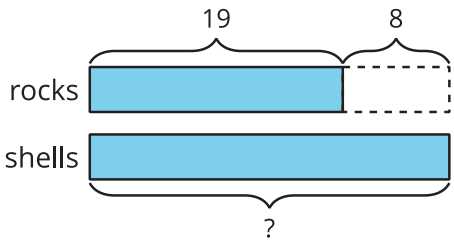
Standards Alignments

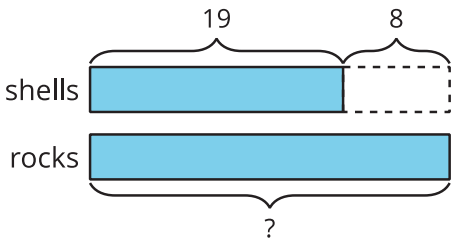
Addressing 2.OA.A.1

Student-facing Task Statement

Children found shells and rocks at the beach. They found 8 more shells than rocks. They found 19 rocks. How many shells did the children find?

1. Circle the diagram that matches the story problem.





2. Explain how you know the diagram matches the story.

Student Responses

1. Circles left choice.
2. Sample response: The diagram matches because it shows that there will be more shells than rocks. It doesn't tell how many shells so that's why it has a ?

Begin Lesson

Warm-up

10 min

Number Talk: 10 and Some More

Standards Alignments

Addressing 2.OA.B.2

The purpose of this Number Talk is to elicit strategies and understandings students have for making 10 when adding. These understandings help students develop fluency with operations within 20.
When students look for ways to rearrange and decompose numbers to make 10, they notice and make use of structure of expressions and whole numbers (MP7).

Instructional Routines

Number Talk

Student-facing Task Statement

Find the value of each sum mentally.

- $4 + 8 + 2$
- $4 + 5 + 3 + 2$
- $9 + 3 + 1$
- $9 + 5$

Student Responses

- 14: $8 + 2 = 10$ and $10 + 4 = 14$

Launch

- Display one expression.
- "Give me a signal when you have an answer and can explain how you got it."
- 1 minute: think time

Activity

- Record answers and strategies.
- Keep expressions and work displayed.
- Repeat for each expression.

- 14: $5 + 3 = 8$ and $8 + 2 = 10$, so it's like the first one. $10 + 4 = 14$
- 13: $9 + 1 = 10$ and $10 + 3 = 13$
- 14: I know 5 is $1 + 4$, so $9 + 1 = 10$ and $10 + 4 = 14$

Synthesis

- "How did making a ten help when finding the sums?"

Activity 1

15 min

Shell Collections

Standards Alignments

Addressing 2.OA.A.1

The purpose of this activity is for students to interpret a Compare problem with the smaller value unknown and connect the problem to a tape diagram. The launch of the activity is an opportunity for students to share their experiences and ask questions about a beach to ensure each student has access into the context. If it is helpful, display a few images from beaches from different areas around the world. The story problem is introduced without numbers in order to allow students to consider the relationship between quantities. Students consider who has more or less, which supports their interpretation of the tape diagram. If needed to help students connect the tape diagram to the subtraction equation, show students that if you look at Diego's rectangle and cover up the portion below that part that shows 20, it will be the same as Lin's rectangle.

At the beginning of this activity, make sure students do not have their workbook open yet.

Access for Students with Disabilities

Action and Expression: Develop Expression and Communication. Give students access to connecting cubes to build the comparison with a concrete manipulative. The numbers from the problem are shown exactly, with the difference very apparent as well. This supports the pictorial images of the tape diagrams.
Supports accessibility for: Conceptual Processing, Organization

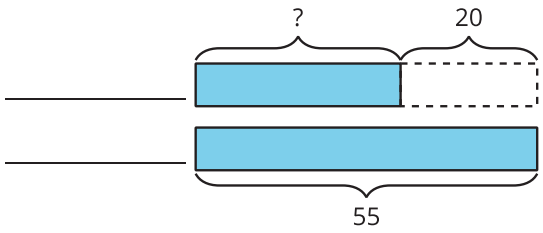
Student-facing Task Statement

Diego has 55 shells. Lin has 20 fewer shells than Diego.

Launch

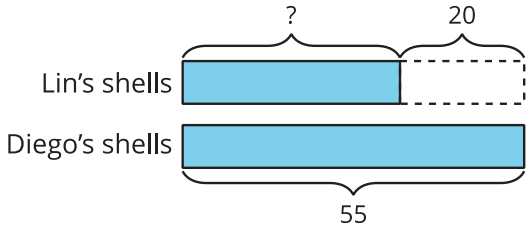
- Groups of 2
- "I am going to tell you a quick story about two students who visited a beach. But

1. Use the story problem to complete the diagram.



2. Write an equation to show how you could find the unknown number of shells. Use a question mark to represent the unknown.

Student Responses

1. 

2. Sample responses: 55 – 20 = ? or ? + 20 = 55

before I do, tell your partner something you know or questions you have about a beach."

- Share responses.
- "Now, our story: Diego has some shells. Lin has fewer shells."
- "Talk to your partner about how many shells Diego could have and how many shells Lin could have."
- Share responses. Highlight that Diego has more and ask how they know he should have more.
- 1 minute: partner discussion
- Record responses.

Activity

- "Diego has 55 shells and Lin has 20 fewer shells than Diego."
- Display the partially-labeled diagram.
- "This diagram shows some parts of the story problem you just read, but it is missing some labels."
- "Label the diagram so that it shows how many shells Diego has and how many Lin has. Then write an equation to show how you could find the unknown part. Use a question mark to show the unknown."
- 2 minutes: independent work time
- 3 minutes: partner discussion
- Monitor for students who explain how each part of the diagram and equation connects to the story problem.

Synthesis

- Invite previously identified student(s) to explain how they labeled the tape diagram.
- Consider asking:
  - "Which part represents Diego's shells? How do you know?"

  - "Which part represents Lin's shells? How do you know?"
  - "Which part shows the difference between the amount of shells each student has?"
  - "Could someone explain how _____ decided to label the diagram in their own words?"
- Invite previously identified student(s) to share the equation they used to represent the story problem.
- "How did you use the diagram to write your equation?" (The diagram helped me see I could start with 55 and take away 20 to find Lin's shells. The diagram helped me see that Lin's shells and 20 more would be the same as 55.)
- Consider having student(s) describe what the numbers and symbols in the equation represent, as they did for the diagram.

Activity 2

20 min

Card Sort: At the Beach

Standards Alignments

Addressing 2.OA.A.1

The purpose of this activity is for students to connect Compare problems, tape diagrams, and equations with unknowns in all positions. Support students with interpreting "more" or "fewer" in the context of the story problem by encouraging them to explain which quantity should be the bigger quantity and which should be the smaller quantity. Ask them to describe what they look for in a diagram or equation to make sure it matches a story problem. When students analyze and connect the quantities and structures in the story problems, diagrams, and equations, they think abstractly and quantitatively (MP2) and make use of structure (MP7).

If students are not yet reading independently, consider reading one story problem at a time and giving students time to independently find their matches. It is recommended to read the story problems in order beginning with story problem A if facilitated in this way.

Access for English Learners

MLR8 Discussion Supports. To support students as they take turns finding a match and explaining their reasoning, display the following sentence frames for all to see: "I noticed ___ , so I matched . . ." Encourage students to challenge each other when they disagree.
Advances: Speaking, Conversing

Instructional Routines

Card Sort

Materials to Copy

Card Sort: At the Beach (groups of 2)

Required Preparation

- Create a set of cards from the Instructional master for each group of 2.

Student-facing Task Statement

1. Read a card with a story problem.
2. Find cards that match the story problem.
3. Explain why the cards match.

Student Responses

Sample responses:

- A-K-Q
- B-G-O-M
- C-I-M-O
- D-J-N-P
- E-L-R
- F-H-P-N

Launch

- Groups of 2
- Give each group a set of cards from the Instructional master.
- "Lin and Diego want to compare other things they collected and did at the beach."
- "Find one diagram and one equation that match a story problem. There may be more than one equation that matches each story problem."
- "Take turns reading a story problem. After one partner reads, work together to find other cards that match. When you think you have found a match, explain to your partner why the cards match."
- "If it helps, you may label the diagrams to explain your matches."
- As needed, demonstrate the activity with a

student volunteer.

Activity

- 8 minutes: partner work time
- Monitor for students who explain how each diagram and equation matches the quantities in the context of the story problem.
- “Compare your matches with the matches of another group. If you have different matches, work together to explain which cards belong or why a card could belong to different groups.”
- 4 minutes: small-group work time

Synthesis

- Invite 2–3 student groups to share their matches. Consider selecting groups to share their matches for story problems A, B, and C.
- Consider asking:
  - “How do you know the diagram matches the story problem?”
  - “How does your equation match the story problem?”
  - “Is there another equation that could match your story problem? How do you know?”

Advancing Student Thinking

If students match story problems with equations or diagrams that do not accurately show the quantities or their relationships, consider asking:

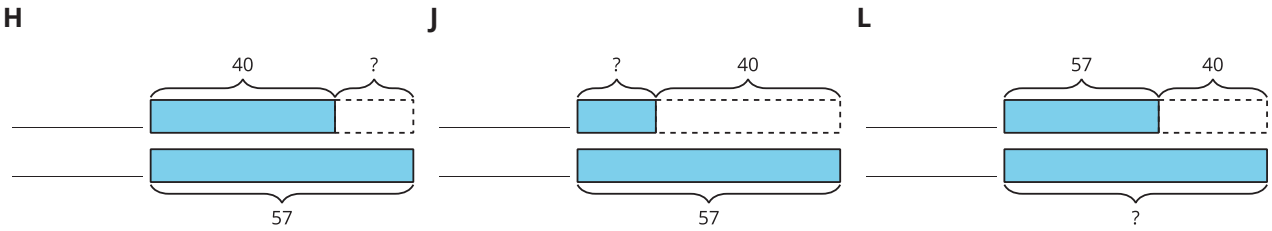
- "How did you choose which equation or diagram matches the story?"
- "Can you explain how the story problem matches this diagram or equation?"

Lesson Synthesis

10 min

"Today, we worked more with diagrams to represent Compare story problems. Diagrams can help show if we need to find the bigger number, the smaller number, or the difference."

Display: Card H, J, and L from Activity 2.



"Which diagram shows that you are looking for the bigger number? How do you know?" (L because the bigger bar has a question mark.)

"Which diagram shows that you are looking for the smaller number? How do you know?" (Diagram J, because the smaller bar has a question mark.)

Suggested Centers

- Number Puzzles: Addition and Subtraction (1–4), Stage 2: Within 20 (Addressing)
- Shake and Spill (K–2), Stage 5: Cover (up to 20) (Supporting)
- Sort and Display (1–3), Stage 2: Picture or Bar Graphs (Addressing)

Complete Cool-Down

Response to Student Thinking

Students circle the correct diagram, but don't write an explanation that supports their choice.

Next Day Support

- Before the warm-up, have students work in partners to discuss a correct response to this cool-down. Provide time for students to summarize or restate their partner's thinking.

Lesson 16: Solve All Kinds of Compare Problems

Standards Alignments

Addressing 2.OA.A.1, 2.OA.B.2

Teacher-facing Learning Goals

- Solve Compare problems with unknowns in all positions within 100.

Student-facing Learning Goals

- Let's solve Compare problems.

Lesson Purpose

The purpose of this lesson is for students to solve Compare problems with an unknown in all positions.

The number choices in the Compare problems in this lesson encourage students to use methods based on place value to find the unknown value. Students may look for ways to compose a ten or subtract multiples of ten when finding unknown values within 100. Students will subtract numbers other than multiples of ten within 100 in future lessons. Encourage students to use a tape diagram to make sense of the problem if it is helpful.

This lesson has a Student Section Summary.

Access for:

Students with Disabilities

- Engagement (Activity 1)

English Learners

- MLR8 (Activity 1)

Instructional Routines

MLR6 Three Reads (Activity 2), True or False (Warm-up)

Lesson Timeline

Warm-up	10 min
Activity 1	20 min
Activity 2	20 min
Lesson Synthesis	10 min
Cool-down	5 min

Teacher Reflection Question

What connections did students make between story problem contexts and the placement of the question mark in tape diagrams? How are students using tape diagrams to make sense of Compare problems?

Cool-down (to be completed at the end of the lesson)

5 min

Compare the Pages

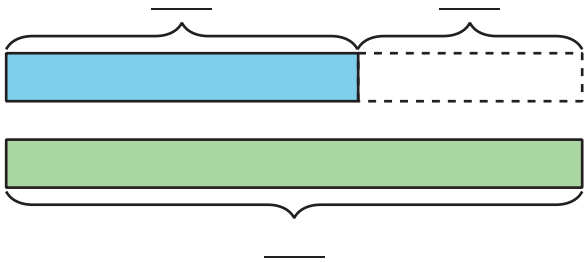
Standards Alignments

Addressing 2.OA.B.2

Student-facing Task Statement

Jada read 17 pages. Noah read 9 more pages than Jada. How many pages did Noah read?

Show your thinking using drawings, numbers, words, or an equation. If it helps, you can use the diagram.

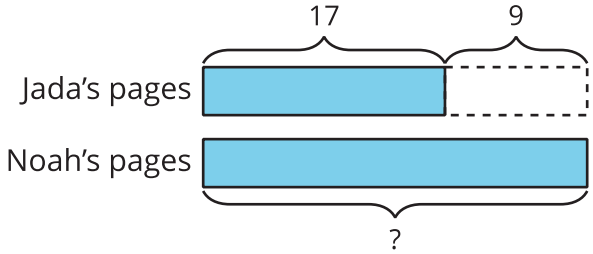


Student Responses

Noah read 26 pages.

Sample responses:

$17 + 9 = ?$



$16 + 1 + 9 = 26$

Begin Lesson

Warm-up

10 min

True or False: Multiples of 10

Standards Alignments

Addressing 2.OA.B.2

The purpose of this True or False is to elicit strategies and understandings students have for composing a ten when adding within 100. This will be helpful in the lesson as students add within 100 to find unknown values in Compare problems. It also helps students develop fluency with addition within 100 and deepens their understanding of the properties of operations and structure of whole numbers (MP7).

Instructional Routines

True or False

Student-facing Task Statement

Decide if each statement is true or false. Be prepared to explain your reasoning.

- $18 + 5 = 18 + 2 + 3$
- $28 + 5 = 30 + 3$
- $38 + 4 = 40 + 3$

Student Responses

- True: $2 + 3 = 5$, so $18 + 2 + 3$ has the same value as 18 + 5. The answer on both sides would be 23.
- True: $28 + 2 = 30$ and $5 - 2 = 3$, so $28 + 5$ has the same value as $30 + 3$.
- False: $38 + 2 = 40$, so there would not be 3 left over from 4, only 2.

Launch

- Display one statement.
- “Give me a signal when you know whether the statement is true and can explain how you know.”
- 1 minute: quiet think time

Activity

- Share and record answers and strategy.
- Repeat with each statement.

Synthesis

- "How could you change 28 + 5 to be 30 + 3?" (I could take 2 from 30 and add it to 3.)

Activity 1

20 min

A Trip to the Library

Standards Alignments

Addressing 2.OA.A.1

The purpose of this activity is for students to represent and solve Compare story problems. Students label a tape diagram based on the given information and represent the unknown with a question mark. When students connect the story problem and the diagram, they look for and make sense of the structure of the problem (MP2).

In the launch of the activity, it may be helpful to ask students to share what they know or have questions about in regards to a library to ensure each student has access into the context and understands books are checked out and returned.

Access for English Learners

MLR8 Discussion Supports. Synthesis: Give students 2–3 minutes to plan what they will say and practice with a partner before they present to the class. Encourage them to ask each other questions by using sentence frames such as, “Can you say more about . . .?” and, “Why did you . . . ?”
Advances: Speaking, Conversing, Representing

Access for Students with Disabilities

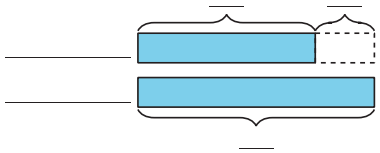
Engagement: Provide Access by Recruiting Interest. Provide choice. Invite students to decide in which order to complete the problems. Allow the students to choose where to start.
Supports accessibility for: Attention, Social-Emotional Functioning

Student-facing Task Statement

1. Priya and Andre returned books to the library. Priya returned 29 books. Andre returned 8 more books than Priya.
   a. Who returned more books?
   b. Use the story problem to complete the diagram.

Launch

- Groups of 2
- Read the first part of the task statement.
- “Who returned more books?”
- 1 minute: quiet think time
- Share responses.
- “How do you know?”

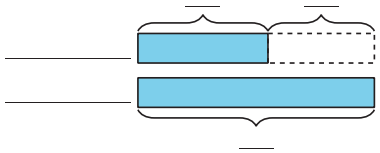


c. How many books did Andre return?

2. Andre read 45 pages of his book last night. Priya read 20 fewer pages of her book than Andre.

   a. Who read more pages?

   b. Use the story problem to complete the diagram.

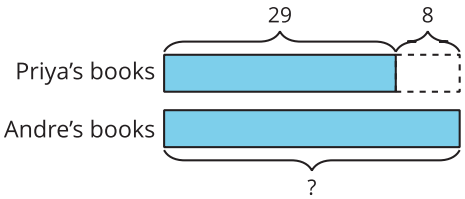


   c. How many pages did Priya read?

Student Responses

1.

   a. Andre returned more books.



   b.

   c. He returned 37 books. $29 + 8 = 37$

2.

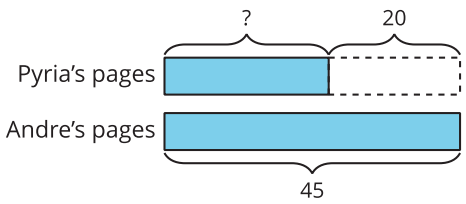
   a. Andre read more pages.

Activity

- "You're going to keep working on this problem and solve another one like it. There is a diagram to use to represent each problem. You can choose to label the diagram first or answer the questions and then complete the diagram."
- 10 minutes: independent work time
- Monitor for students who started with the tape diagram on each problem to share during the synthesis.
- If students finish early, ask them if they can write their own problem that can be represented by a diagram.

Synthesis

- Display student work for the first problem.
- Students explain their work, describing how they used the tape diagram.
- "Does anyone have a question for _____ about their thinking or work?"
- "How did you know where to put the numbers and the question mark in this problem?"
- Repeat for second problem.



c. Priya read 25 pages. $45 - 20 = 25$

Advancing Student Thinking

If students identify which student has more, but the labels do not reflect this, consider asking, "Can you explain how you decided where each label should go?" "How do you know which quantity is bigger or smaller?" "How does this connect to the story?"

Activity 2

20 min

Solve Compare Problems

Standards Alignments

Addressing 2.OA.A.1

This activity begins with the use of the Three Reads Math Language Routine. This routine helps students practice a way to make sense of a problem and persevere in solving it (MP1). The purpose of this activity is for students to analyze and solve a variety of Compare problems. Students may use tape diagrams or any other method that makes sense to them to solve each story problem. Monitor for the different methods students use, including drawings other than tape diagrams and the use of equations. Also, monitor for how students compute and describe their computations when finding the unknown values. Listen for methods based on place value and making a ten.

Students begin the activity by looking at the first story problem displayed, rather than in their books. At the end of the launch, students open their books and work on the story problems. If students do not show their reasoning using a tape diagram and their equation does not match the story problem, ask them to describe the mathematics of the story problem by explaining what each quantity represents in the context of the story. As needed, draw an unlabeled tape diagram to support student thinking.

This activity uses *MLR6 Three Reads*. Advances: reading, listening, representing.

Instructional Routines

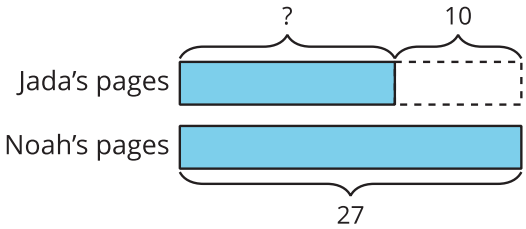
MLR6 Three Reads

Student-facing Task Statement

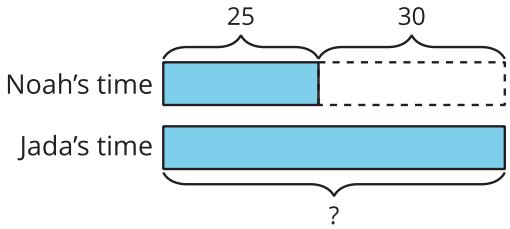
1. Jada read 10 fewer pages than Noah. Noah read 27 pages. How many pages did Jada read?
2. Noah spent 25 minutes reading. Jada spent 30 more minutes reading than Noah. How many minutes did Jada spend reading?
3. Jada read 47 pages of the book. Noah read 20 pages of the book. How many fewer pages did Noah read?
4. Noah stacked 14 more books than Jada. Jada stacked 28 books. How many books did Noah stack?

Student Responses

1. Jada read 17 pages. Sample response: $27 - 10 = 17$



2. Jada spent 55 minutes reading. Sample response: $25 + 30 = 55$



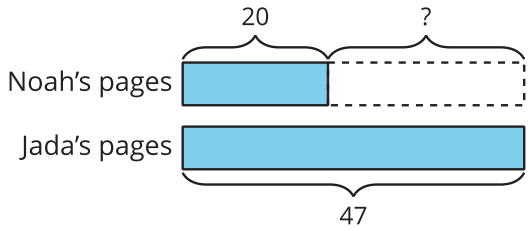
3. Noah read 27 fewer pages of the book. Sample response: $47 - 20 = 27$

Launch

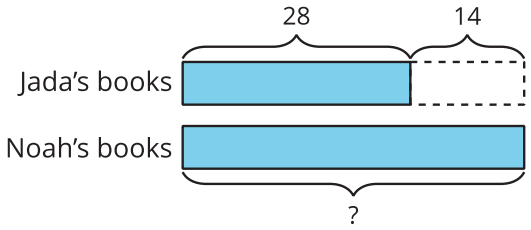
- Groups of 2

MLR6 Three Reads

- Display only the story problem stem for question 1, without revealing the question.
- "We are going to read this story problem 3 times."
- 1st read: "Jada read 10 fewer pages than Noah. Noah read 27 pages."
- "What is this story about?"
- 1 minute: partner discussion.
- Listen for and clarify any questions about the context.
- 2nd read: "Jada read 10 fewer pages than Noah. Noah read 27 pages."
- "What are all the things we can count in this story?" (We could count the pages Jada read, the books, the pages they read together.)
- 30 seconds: quiet think time
- 2 minutes: partner discussion
- Share and record all quantities.
- Reveal the question(s)
- 3rd read: Read the entire problem, including the question, aloud.
- "What are different ways we can solve this problem?" (We could make a tape diagram. We could write equations.)
- 30 seconds: quiet think time
- 1–2 minutes: partner discussion



4. Noah stacked 42 books. Sample response: $28 + 14 = 42$



Activity

- "Today, you're going to solve problems with your partner. Show your thinking using drawings, numbers, words, or an equation."
- "Remember to ask yourselves questions as you make sense of the problem and create representations."
- 12 minutes: partner work time
- As students work, monitor for different representations to share during the synthesis:
  - tape diagrams
  - equations
  - other labeled drawings or diagrams.

Synthesis

- Display student work that shows different ways to represent how many more minutes Jada spent reading.
- "What's the same about their representations? What's different?"
- 1 minute: quiet think time
- 1 minute: partner discussion
- "How did your representation help you decide whether to add or subtract?"
- If time, discuss computation strategies:
  - adding and subtracting tens with tens (problems 2 and 3)
  - decompose to make a ten (problem 4)

Lesson Synthesis

10 min

"Today we made sense of and solved many Compare problems. What did you do to figure out how to solve these problems?" (Read the problem carefully and several times to figure out who did more, who

did less, and the difference. Made a diagram to show all of the information.)

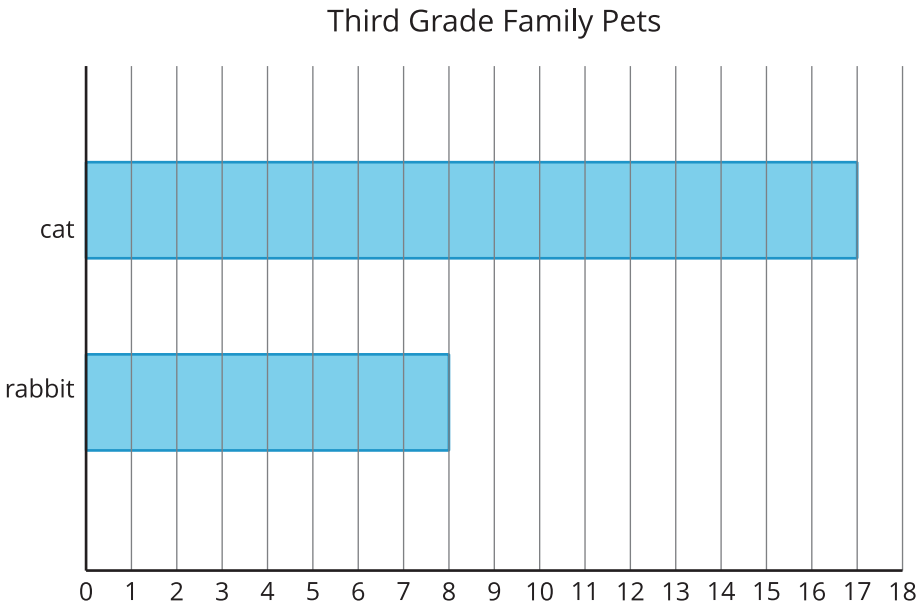
Share and record strategies for all to see.

Suggested Centers

- Number Puzzles: Addition and Subtraction (1–4), Stage 2: Within 20 (Addressing)
- Shake and Spill (K–2), Stage 5: Cover (up to 20) (Supporting)
- Sort and Display (1–3), Stage 2: Picture or Bar Graphs (Addressing)

Student Section Summary

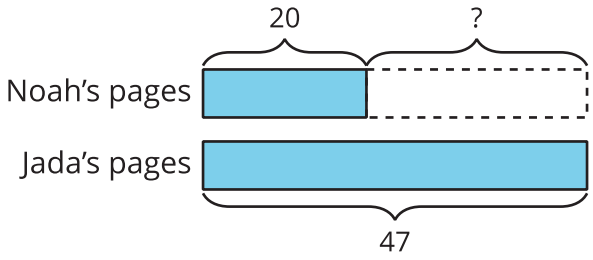
In this section of Unit 1, we learned how to represent and solve Compare problems. First, we used bar graphs to find the difference between two categories.



How many more students have cats than have rabbits? Show two ways to find the difference.

We learned about a new representation called a diagram. It helps us make sense of story problems. We can use diagrams to show which part of a comparison we need to find.

Jada read 47 pages of the book. Noah read 20 pages of the book. How many fewer pages did Noah read?



In this problem, we are finding the difference. We know how many pages Noah and Jada read, so the ? represents the difference.

Complete Cool-Down

Response to Student Thinking

Students find the value of the difference between 17 and 9 (difference unknown) rather than the value of the sum of 17 and 9 (greater unknown).

Next Day Support

- During the warm-up of the next lesson, have students practice labeling a diagram and discussing who has more.

Lesson 17: Center Day 3 (Optional)

Standards Alignments

Addressing 2.MD.D.10, 2.NBT.A.2, 2.NBT.B.5

Teacher-facing Learning Goals

- Count large collections of objects.
- Practice adding within 50.
- Represent data using picture and bar graphs.

Student-facing Learning Goals

- Let's count large groups of objects and play games to practice adding and creating graphs.

Lesson Purpose

The purpose of this lesson is for students to count large groups of objects by creating smaller groups of 5 or 10. Students practice adding within 50 or representing data with graphs.

This lesson is optional because it is an opportunity for extra practice that not all classes may need. In Activity 1, students revisit stage 3 of the Counting Collections, which was first introduced in Kindergarten. In this stage, called Estimate and Count Up to 120, students count collections of up to 120 objects and represent how they counted. In Activity 2, students choose between two previously introduced centers focused on adding and subtracting within 50 or representing data with graphs.

Instructional Routines

Number Talk (Warm-up)

Materials to Gather

- Counting collections: Activity 1
- Materials from previous centers: Activity 2

Materials to Copy

- 10-Frame Standard (groups of 1): Activity 1
- Counting Collections Stage 3 Recording Sheet (groups of 1): Activity 1

Lesson Timeline

Warm-up	10 min
Activity 1	20 min
Activity 2	25 min
Lesson Synthesis	10 min

Teacher Reflection Question

What did students show you they understand about place value in today's lesson? How can you use what you learned today about your students in your upcoming lessons?

Begin Lesson

Warm-up

10 min

Number Talk: Add Ten More

Standards Alignments

Addressing 2.NBT.B.5

The purpose of this Number Talk is to elicit strategies and understandings students have for counting by ten and adding by place value. These understandings help students develop fluency and will be helpful later in this lesson when students develop ways to efficiently count large collections of objects. Students show an understanding of place value when they observe that the sums have the same digit in the ones place but the digit in the tens place changes (MP7).

Instructional Routines

Number Talk

Student-facing Task Statement

Find the value of each sum mentally.

- $27 + 10$
- $27 + 10 + 10$
- $27 + 30$
- $37 + 30$

Student Responses

- 37: I started at 27 and I added one more ten.
- 47: I started at 27 and counted on by ten. 27, 37, 47.
- 57: I added three tens to 27. 3 tens + 2 tens is 5 tens.
- 67: 3 tens + 3 tens = 6 tens. 6 tens 7 ones = 67

Launch

- Display one expression.
- "Give me a signal when you have an answer and can explain how you got it."
- 1 minute: quiet think time

Activity

- Record answers and strategy.
- Keep expressions and work displayed.
- Repeat with each expression.

Synthesis

- "How did you use what you know about place value to find the sums?" (I knew I could start at 27 and count by ten. I knew 30 is the same as 3 tens. I know I could add the tens from

each number together and the ones together.)

Activity 1

20 min

Revisit Counting Collections

Standards Alignments

Addressing 2.NBT.A.2

The purpose of this activity is for students to revisit stage 3 of the Counting Collections center. Students are given a collection of up to 120 objects. They record an estimate for how many objects they think are in their collection. Then, they work with a partner to figure out how many objects are in their collection and each partner records how many. Students may draw pictures, write numbers or equations, or use base-ten representations to show their collection. The large groups of objects encourage students to use more sophisticated counting methods such as grouping and counting by twos, fives, or tens. Monitor for students who group objects, count by tens, and justify their total by connecting their total to the number of tens and ones they counted.

10-frames are provided as a Instructional master. Students will continue to use these throughout the year. Consider copying them on cardstock or laminating them and keeping them organized to be used repeatedly. Bags of objects should be saved for use in later lessons.

Materials to Gather

Counting collections

Materials to Copy

10-Frame Standard (groups of 1), Counting Collections Stage 3 Recording Sheet (groups of 1)

Required Preparation

- Each group of 2 needs a collection of 100–120 objects.

Launch

- Groups of 2
- Give each group a collection of 100–120 objects.
- “We are going to revisit a center you may have

played in Kindergarten or first grade. You and your partner will get a collection of objects. Your job is to figure out how many objects are in your collection and show how you counted."

Activity

- 8 minutes: partner work time
- If needed:
  - "How are you going to count your collection?"
  - "How many objects were in your collection? Can you prove it to me?"
  - "Can you draw a picture to show how you counted?"
- Monitor for students who organize their objects into groups of 10 as they count and create a representation with drawings or numbers.

Synthesis

- Select previously identified students to share.
- "How did you keep track as you counted?"
- "How did _____ represent how they counted?"

Activity 2

25 min

Centers Choice Time

Standards Alignments

Addressing 2.MD.D.10, 2.NBT.B.5

The purpose of this activity is for students to choose from activities that focus on adding and subtracting or sorting and representing data.

Students choose from any stage of previously introduced centers.

- What's Behind My Back?
- How Close?
- Number Puzzles
- Sort and Display

Materials to Gather

Materials from previous centers

Required Preparation

Gather materials from:

- What's Behind My Back, Stages 2 and 3
- How Close, Stages 1–3
- Number Puzzles, Stages 1 and 2
- Sort and Display, Stage 2

Student-facing Task Statement

Choose a center.

What's Behind My Back?

How Close?

Number Puzzles

14 = 8 + ☐

Sort and Display

Launch

- “Today you will choose from centers we have already learned.”
- Display the center choices in the student book.
- “Think about what you would like to do first.”
- 30 seconds: quiet think time

Activity

- Invite students to work at the center of their choice.
- 10 minutes: center work time
- "Choose what you would like to do next."
- 10 minutes: center work time

Synthesis

- "Which activity did you choose? What did you like about the activity you chose?"

Lesson Synthesis

10 min

"Today we chose activities to work on and worked with a partner during center time."

Math Community

Display chart from previous sections and read the norms to students.

"What went well? What can we continue to work on?"

Lesson 18: Class Surveys (Optional)

Standards Alignments

Addressing 2.MD.D.10, 2.OA.A.1, 2.OA.B.2

Teacher-facing Learning Goals

- Collect, organize, and represent data from survey questions.
- Create questions related to survey data.
- Interpret results of a survey and represent findings.

Student-facing Learning Goals

- Let's create our own surveys to get to know our classmates better.

Lesson Purpose

The purpose of this lesson is for students to use what they have learned about data, bar graphs, and tape diagrams to create a survey and to organize, collect, and represent data. Students use their understanding of adding and subtracting to ask and answer questions related to the data.

This lesson is optional because it does not address any new mathematical content standards. This lesson does provide students with an opportunity to apply precursor skills of mathematical modeling.

In previous lessons, students analyzed and represented categorical data using picture and bar graphs. They generated statements, expressions, and equations based on the data in graphs and other displays.

In this lesson, students work in pairs to create their own survey question, collect categorical data, organize their data, and represent their findings with a bar graph or picture graph. Students are invited to represent comparisons with a tape diagram and equation that reflect what they learned about their classmates from their data.

This lesson supports the development of mathematical modeling skills by providing students opportunities to make choices about their approach for collecting data, determine appropriate equations to represent the situation, and choose ways to best represent their analysis (MP4).

This lesson is allocated to be more than 60 minutes, but it can be adjusted to meet the needs of the students. The activities can be modified to fit within 1 day or extend to span over 2 days.

Access for:

Students with Disabilities

- Engagement (Activity 1)

Instructional Routines

What Do You Know About _____? (Warm-up)

Materials to Gather

- Colored pencils: Activity 1

Materials to Copy

- Picture and Bar Graph Template (groups of 1): Activity 1

Lesson Timeline

Warm-up	10 min
Activity 1	30 min
Activity 2	15 min
Activity 3	15 min
Lesson Synthesis	10 min

Teacher Reflection Question

Reflect on how you can reinforce the work done in today's lesson outside of math class. When can you ask students questions involving organizing or interpreting categorical data? How can you incorporate this work into other subject areas, such as science or social studies?

Begin Lesson

Warm-up

10 min

What Do You Know About Bar Graphs?

Standards Alignments

Addressing 2.MD.D.10

The purpose of this What Do You Know About ____? is to invite students to share what they have learned about bar graphs and how they can use them.

Instructional Routines

What Do You Know About _____?

Student-facing Task Statement

What do you know about bar graphs?

Student Responses

- Shows how many in each group.
- It's a graph with a bar.
- There are numbers on a scale on the left side.

Launch

- "What do you know about bar graphs?"
- 1 minute: quiet think time

Activity

- "Discuss your thinking with your partner."
- 1 minute: partner discussion
- Share and record responses.

Synthesis

- "What is an example of how we might use a bar graph?" (You can use it to show data that you collected after asking a question or counting things. You could show favorite ice cream flavors or how many of each kind of animal we saw at the zoo.)
- "What are other ways you can represent data?" (picture graphs, lists, tallies, tables)

Activity 1

30 min

Classroom Survey and Graph

Standards Alignments

Addressing 2.MD.D.10

The purpose of this activity is for students to create a survey, collect and organize their data, and represent their data as a picture or bar graph.

To add movement to this activity, consider a gallery walk for students to see and compare the different representations of their data.

Access for English Learners

MLR7 Compare and Connect. Synthesis: Display select survey questions. Invite students to consider what they notice about the language of survey questions. Amplify observations related to the structure of questions, including common words and phrases.
Advances: Reading, Representing

Access for Students with Disabilities

Engagement: Provide Access by Recruiting Interest. Use visible timers or audible alerts to help students monitor their progress, and make sure they have enough time to survey all their classmates.
Supports accessibility for: Attention, Organization

Materials to Gather

Colored pencils

Materials to Copy

Picture and Bar Graph Template (groups of 1)

Student-facing Task Statement

1. What is your survey question?
2. What are your categories?
   - Category 1: _____
   - Category 2: _____
   - Category 3: _____
   - Category 4: _____
3. Record the data.
4. Organize and represent the data in a picture graph or bar graph.

Student Responses

Sample response:

1. What is your favorite pet?
2. cat, dog, fish, hamster

Launch

- Groups of 2.
- "These are some topics we explored in previous lessons."
- Display list of topics:
  - How we get to school
  - Favorite sport
  - Favorite season
  - Field trip choice
  - Recess activity
  - Favorite pet
  - Food for a party
  - Fruits we love
  - Veggies we love
- "With your partner, brainstorm other ideas for things you want to learn about your classmates."
- 2 minutes: partner discussion.
- Invite a few students to share and record responses.

3. Students may record their collected data in a table using numbers or tallies.
4. Students create a bar graph with a title, categories, and scale. Or they create a picture graph with stars to represent each vote or dots.

- “Look through both lists of possible topics for surveying our classmates. With your partner, pick one topic and write a survey question. Decide on 3 or 4 possible responses for your survey question.”
- “Take turns asking your survey question to your partner and record both of your responses in your workbook.”

Activity

- "Now you will ask other students in our class your survey question and record the data you collect."
- 5 minutes: partner work time
- Monitor to ensure students have collected sufficient data.
- While students survey, give each student the graph template and access to colored pencils.
- “Use your data to create a picture or bar graph. “
- 10 minutes: partner work time.
- Monitor for students who create:
    - a picture graph that use pictures that represent each category (for example, drawing each kind of animal for a survey about pets)
    - a picture graph that uses the same abstract picture for each category (for example, drawing a circle to represent each pet in a survey about pets)
    - a bar graph with a clear title, scale, and category labels

Synthesis

- Invite previously selected students to share their graphs.
- “How are these graphs the same? How are they different?” (The bar graph has

numbers on it, but the picture graphs don't. Some have 3 and some have 4 different responses. Some are up and down and some are side-to-side.)

- "What choices did these mathematicians make with their graphs?" (They had to decide what kind of graph to make, a title, which direction to show the bars in how to represent their data so it is clear with a title, labels, or pictures.)

Activity 2

15 min

I Ask, then You Ask

Standards Alignments

Addressing 2.MD.D.10, 2.OA.A.1, 2.OA.B.2

The purpose of this activity is for students to create their own relevant mathematical questions and use their understanding of addition and subtraction to answer questions about their own and their peers' survey data.

Student-facing Task Statement

1. Trade graphs. Create questions about the other group's graph.
   Sentence stems:

   How many students picked _____ and _____ all together?

   How many more students picked _____ than _____?
2. Take turns asking and answering questions.

Launch

- Combine pairs into groups of 4

Activity

- "Switch graphs. Use the sentence stems or create your own questions about the other group's graphs."
- 1–2 minutes: independent work time
- 4 minutes: partner work time.
- "Take turns to ask each other the questions you came up with and use your own graph

Student Responses

1. Sample responses:
   - How many students picked cats and dogs all together?
   - How many more picked dogs than hamsters?
2. Sample responses:
   - 14 students picked cats and dogs. $5 + 9 = 14$
   - 5 more students picked dogs than hamsters. $9 - 4 = 5$

to answer."

- "When possible, write down an equation to show your reasoning."
- 5 minutes: group discussion.
- Monitor for students who write equations to show the categories they combine or compare when answering their peers' questions.

Synthesis

- Invite previously selected students to share.
- "Where do we see the equations in their graph? What does the equation mean?"
- "What's the difference between answering the questions from a bar graph and answering them from a picture graph?"

Advancing Student Thinking

If students rely on counting to find solutions rather than adding or subtracting, consider asking "What equation could you write to represent the categories in the question?"

Activity 3

15 min

Analyze the Data with Diagrams

Standards Alignments

Addressing 2.OA.A.1

The purpose of this activity is for students to analyze what they have learned from the data and representations in the previous activities and to share their findings. In this activity, students select two things they learned and illustrate them using a tape diagram.

Monitor for tape diagrams that can be displayed during the lesson synthesis and compared to the

bar graph selected in a previous activity. While the graph and diagram do not have to be from the same pair, it would be helpful for students to see data from the same survey displayed with different representations.

To add movement to this activity, consider a gallery walk. Students can make their diagrams on poster paper. As students walk around the room, they select a few diagrams and determine what information they learn about their class based on the diagram and equation.

Student-facing Task Statement

1. Draw a diagram. Your diagram should compare two facts you learned from your survey.
2. Write an equation that represents the comparison.

Student Responses

1. A tape diagram that reflects the data students collected.
2. An addition or subtraction equation that represents the tape diagram.

Launch

- Groups of 2
- "You and your partner are going to draw a diagram. Your diagram should compare two facts you learned from your survey."
- "Decide with your partner which 2 facts you want to share with the class and how you will compare the two facts."
- 1 minute: partner discussion.

Activity

- 5 minutes: independent work time
- Students check in with their partners to be sure their representations make sense and are accurate.
- 3 minutes: partner discussion
- Monitor for a few examples of accurate tape diagrams and equations.

Synthesis

- Display selected student work.
- "What information does this diagram or equation tell us about our classmates?"
- "Where do you see this equation in the diagram?"

Lesson Synthesis

10 min

"Today we had a chance to learn more about each other by collecting data and representing it in multiple ways."

Display a student generated bar or picture graph and the tape diagram side by side.

Consider asking:

- "How are these representations the same?" (They are from the same survey.)
- "What information can we see in the picture/bar graph that we don't see in the diagram?" (All of the people that were surveyed.)
- "What information can we see in the diagram that we don't see in the picture/bar graph?" (It's easier to compare two of the groups in the diagram than in the graph.)

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Family Support Materials

Family Support Materials

Adding, Subtracting, and Working with Data

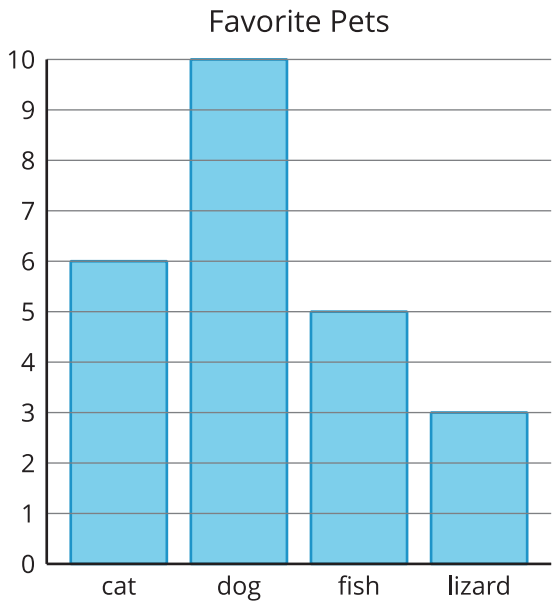
In this unit, students build on what they learned about addition and subtraction in grade 1 to develop fluency with addition and subtraction facts within 20. They learn how to represent and interpret data on picture graphs and bar graphs, and they use these graphs to solve story problems involving addition and subtraction within 100. Students also learn a new representation, tape diagrams, to apply their understanding of the relationship between addition and subtraction and to solve problems.

Section A: Add and Subtract Within 20

In this section, students use what they know about the relationship between addition and subtraction to find the missing values in equations. They use strategies learned in grade 1 such as making a ten, counting on, and counting back to add within 50 and subtract within 20. For example, when adding $8 + 7$, students break apart the 7 into $2 + 5$, and make a ten by adding $8 + 2$ and then add 5, so $8 + 2 + 5 = 15$. Students later use these strategies to add and subtract within 100.

Section B: Ways to Represent Data

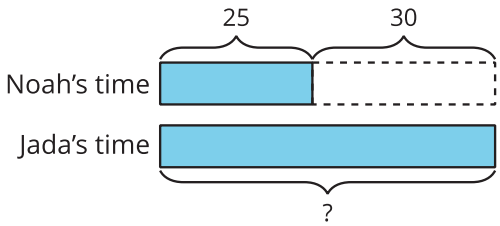
In this section, students are asked to make sense of two new data representations: a picture graph and a bar graph. Students learn to represent and interpret data on these graphs, and they ask and answer questions based on the data.



Section C: Diagrams to Compare

In this section, students solve story problems involving addition and subtraction within 100. The tape diagram is introduced in this section to support students with making sense of story problems and understanding the relationship between addition and subtraction. Before using a tape diagram, students have an opportunity to make sense of its structure and connect it to story problems. As an example the following problem can be represented on this type of diagram.

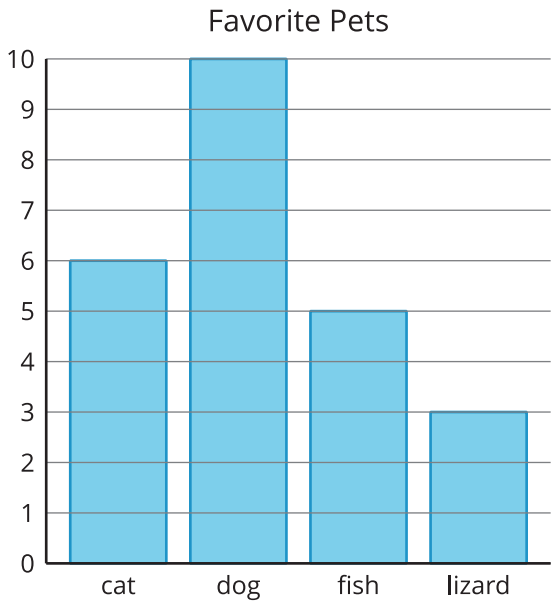
Noah spent 25 minutes swimming. Jada spent 30 more minutes swimming than Noah. How many minutes did Jada spend swimming?



Try it at home!

Near the end of the unit:

1. Ask your student to write as many statements as they can about the bar graph.



2. Ask your student to represent and solve the following problem:

   Andre read 45 pages of his book last night. Priya read 20 fewer pages of her book than Andre. Who read more pages? How many more pages? Explain or show your reasoning.

Questions that may be helpful as they work:

- How does the graph support that statement?
- How does the graph show that piece of information?
- Can you explain to me how you solved the problem?
- What pieces of information were helpful?

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Unit Assessments

Check Your Readiness A, B and C

End-of-Unit Assessment

Adding, Subtracting, and Working with Data: Section A Checkpoint

1. Find the number that makes each equation true.

   a. $6 + ____ = 10$

   b. $20 = 13 + ____$

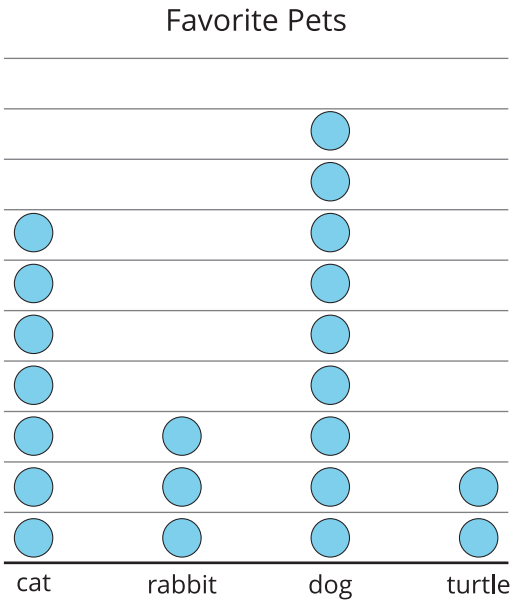
   c. $____ + 8 = 20$

2. Find the value of $15 - 6$. Show your thinking using drawings, numbers, or words.

3. Find the value of $23 + 15$. Show your thinking using drawings, numbers, or words.

Adding, Subtracting, and Working with Data: Section B Checkpoint

1. The graph shows the favorite pets of a group of students.



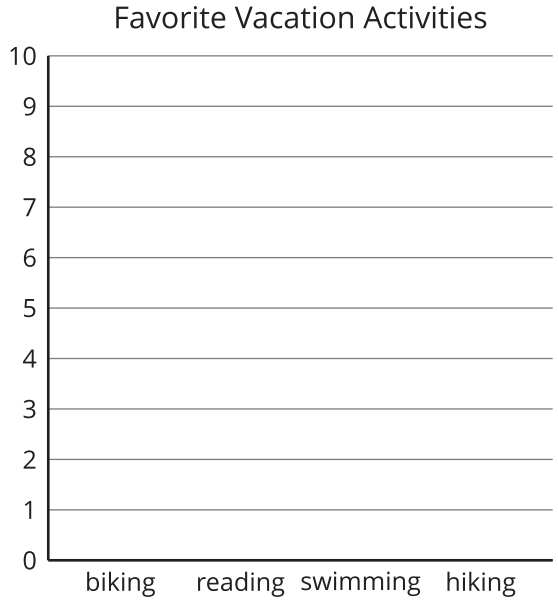
a. How many students' favorite pet was a dog?

b. What is the total number of students who chose a rabbit or a cat?

2. The table shows the favorite vacation activities for students in a class.

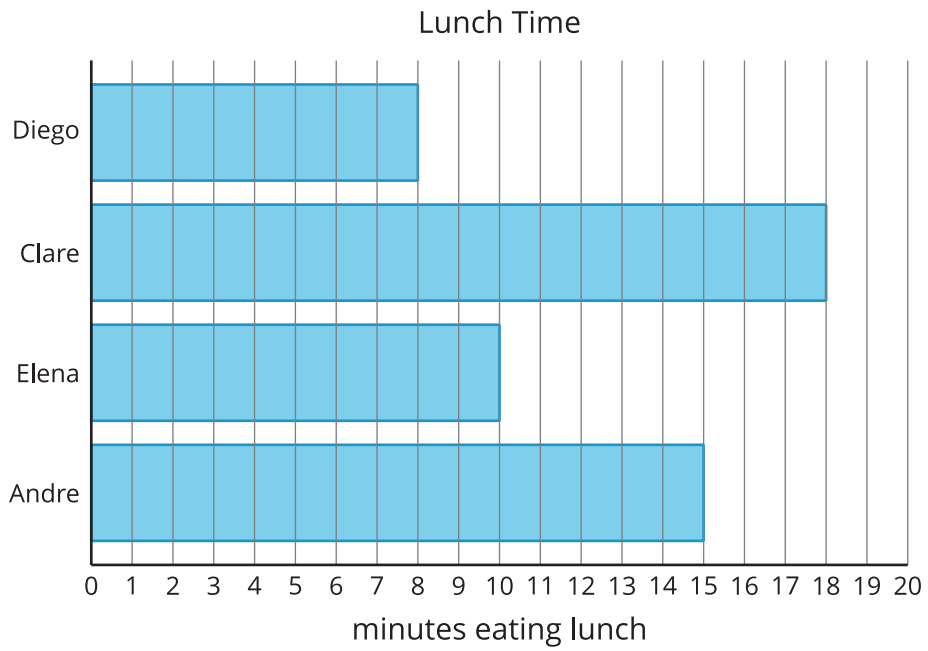
activity	number of students
biking	6
reading	4
swimming	9
hiking	5

Represent the data shown in the table in a bar graph.



Adding, Subtracting, and Working with Data: Section C Checkpoint

1. The graph shows how many minutes some students spent eating lunch.

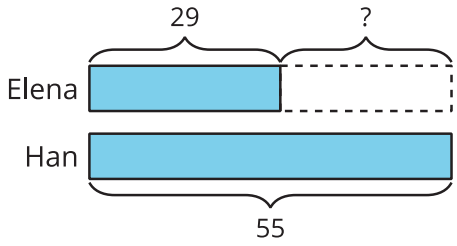


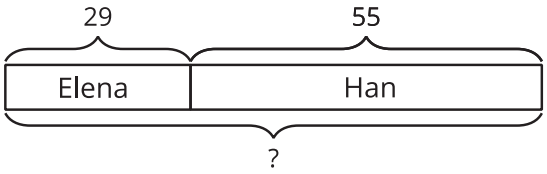
   a. How many more minutes did Clare spend eating lunch than Diego? Show your thinking using drawings, numbers, or words.

   b. Write an equation that represents this situation.

2. Elena has 29 pennies in her piggy bank. Han has 55 pennies in his piggy bank. How many fewer pennies does Elena have than Han?

a. Which tape diagram represents this story? Explain how you know.





_____

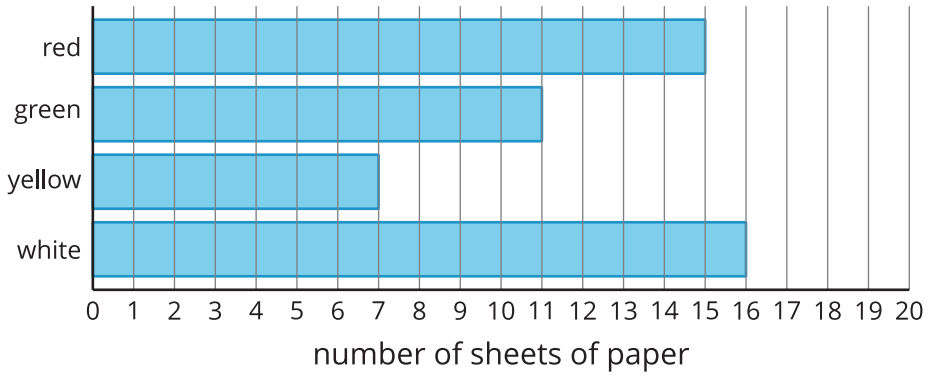
_____

b. Write an equation to show how you could find the unknown number. Use a ? for the unknown number.

c. Find the unknown number.

Adding, Subtracting, and Working with Data: End-of-Unit Assessment

1. The bar graph shows the number of different color sheets of paper on a desktop.



How many more sheets of red paper are there than sheets of yellow paper?

A. 4

B. 7

C. 8

D. 22

2. The table shows the favorite animals of some second grade students.

animal	number of students
dog	7
cat	8
rabbit	4
hippo	1

Represent the data shown in the table with a graph. You can make a bar graph or a picture graph.

3. Find the number that makes each equation true.

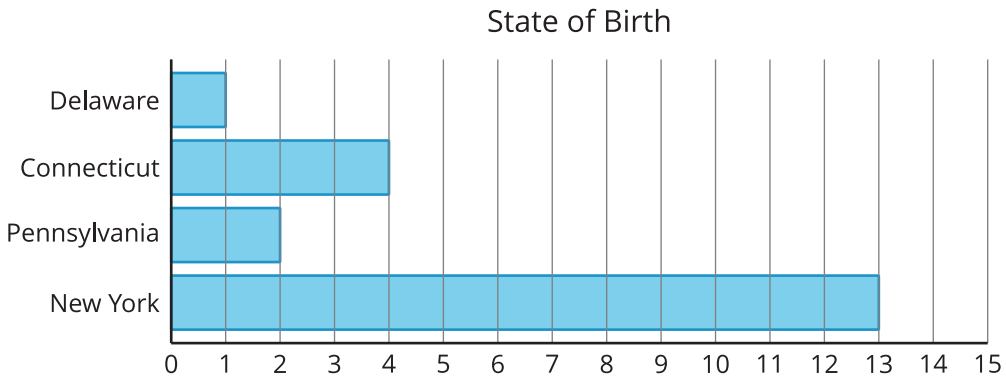
a. $7 + _____ = 18$

b. $20 - _____ = 12$

c. $9 + 7 = _____$

d. $19 - 14 = _____$

4. The bar graph shows the states where the students in a second grade class were born.



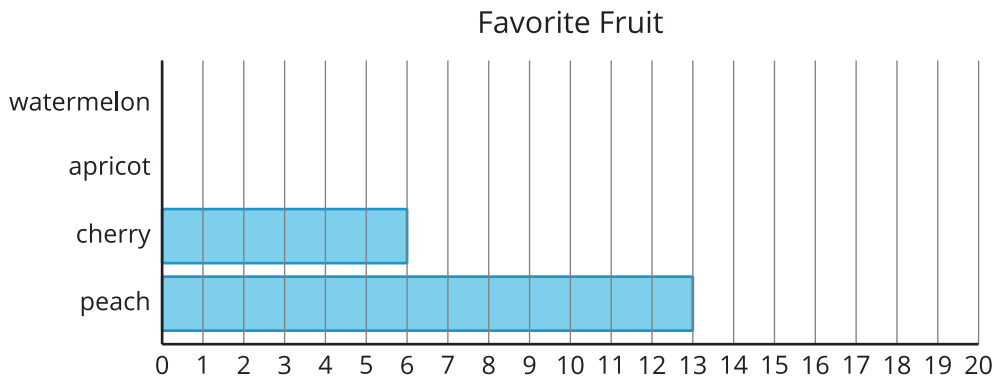
a. How many students in the class were born in New York?

b. How many students in the class were born in Pennsylvania or in Connecticut?

c. How many fewer students in the class were born in Connecticut than in New York?

5. A farmer has 48 chickens on her farm. There are 26 more chickens than there are pigs. How many pigs are there on the farm? Show your thinking using diagrams, numbers, words, or equations.

6. The second grade students at a school chose their favorite summer fruit. The graph shows some of their choices.



a. How many second graders chose cherry or peach?

b. 11 students chose apricot. Show this on the graph.

c. 29 students chose watermelon or apricot. How many students chose watermelon? Show or explain your reasoning.

d. Show the number of students who chose watermelon on the graph.

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Assessment Answer Keys

Check Your Readiness A, B and C

End-of-Unit Assessment

Assessment Answer Keys

Assessment: Section A Checkpoint

Problem 1

Goals Assessed

- Build toward fluency with subtracting within 20.

Find the number that makes each equation true.

a. $6 + ____ = 10$
b. $20 = 13 + ____$
c. $____ + 8 = 20$

Solution

a. 4
b. 7
c. 12

Problem 2

Goals Assessed

- Build toward fluency with subtracting within 20.

Find the value of $15 - 6$. Show your thinking using drawings, numbers, or words.

Solution

9. 6 is 5 and 1 more. I can take 5 from 15 to get 10 and then taking 1 more leaves 9.

Problem 3

Goals Assessed

- Build toward fluency with adding within 100.

Find the value of $23 + 15$. Show your thinking using drawings, numbers, or words.

Solution

Sample response 1:

$20 + 10 = 30$
$3 + 5 = 8$
$30 + 8 = 38$

Sample response 2: There are 2 tens and 1 ten which make 3 tens. There are 3 ones and 5 ones which make 8 ones. Then 3 tens and 8 ones make 38.

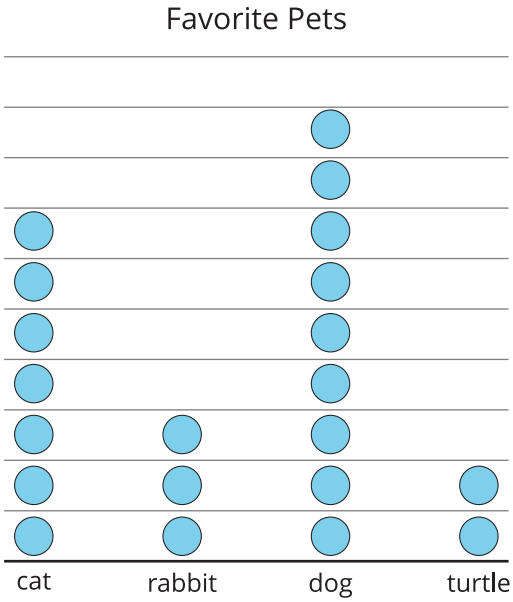
Assessment: Section B Checkpoint

Problem 1

Goals Assessed

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

The graph shows the favorite pets of a group of students.



a. How many students' favorite pet was a dog?
b. What is the total number of students who chose a rabbit or a cat?

Solution

a. 9
b. 10

Problem 2

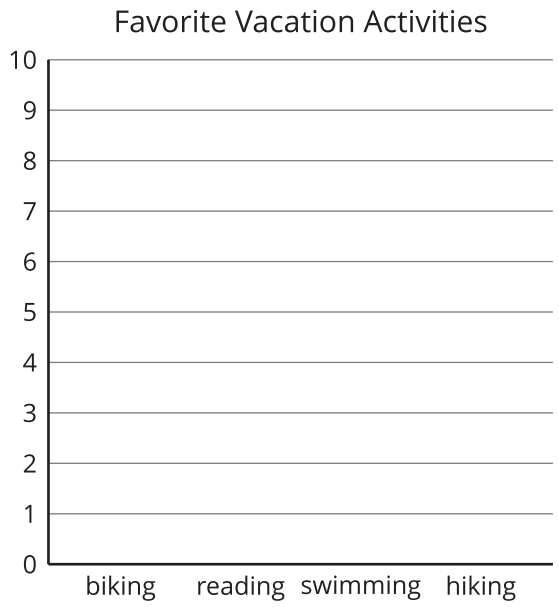
Goals Assessed

- Represent data using picture and bar graphs.

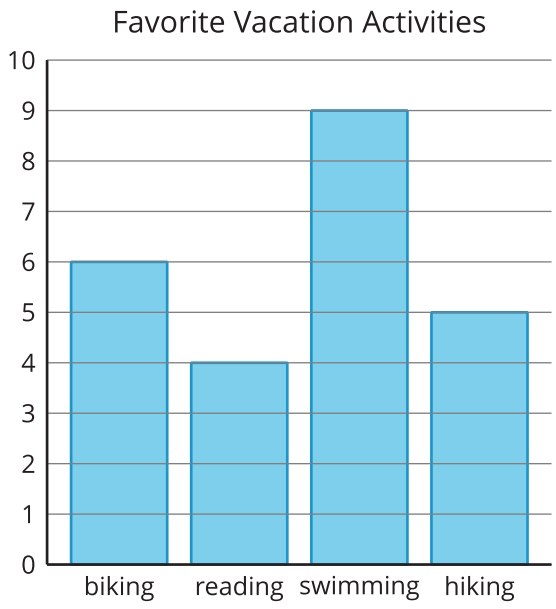
The table shows the favorite vacation activities for students in a class.

activity	number of students
biking	6
reading	4
swimming	9
hiking	5

Represent the data shown in the table in a bar graph.



Solution


Favorite Vacation Activities
10
9
8
7
6
5
4
3
2
1
0
biking
reading
swimming
hiking

Assessment: Section C Checkpoint

Teacher Instructions

Give students access to connecting cubes.

Problem 1

Goals Assessed

- Represent and solve Compare problems with unknowns in all positions within 100.

The graph shows how many minutes some students spent eating lunch.

a. How many more minutes did Clare spend eating lunch than Diego? Show your thinking using drawings, numbers, or words.

b. Write an equation that represents this situation.

Solution

a. 10. Clare spent 18 minutes and Diego spent 8. 18 is 10 more than 8.

b. Sample responses: $18 - 8 = 10$ or $8 + 10 = 18$ or equivalent.

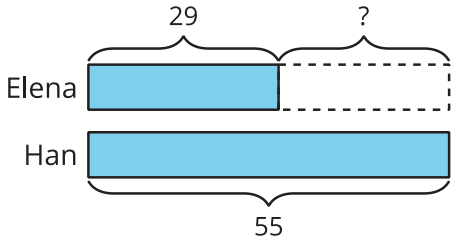
Problem 2

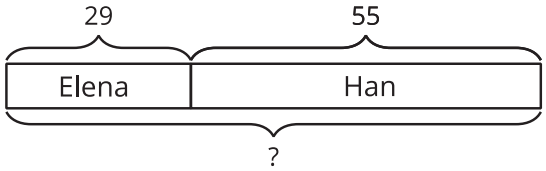
Goals Assessed

- Make sense of and interpret tape diagrams.

Elena has 29 pennies in her piggy bank. Han has 55 pennies in his piggy bank. How many fewer pennies does Elena have than Han?

a. Which tape diagram represents this story? Explain how you know.





b. Write an equation to show how you could find the unknown number. Use a ? for the unknown number.

c. Find the unknown number.

Solution

a. The first tape diagram shows that Elena has 29 pennies and Han has 55 pennies and the ? is for how many more Han has than Elena. The other tape diagram shows how many pennies Elena and Han have together.

b. $29 + ? = 55$ or $55 - 29 = ?$ or equivalent

c. 26

Assessment: End-of-Unit Assessment

Teacher Instructions

Give students access to connecting cubes.

Problem 1

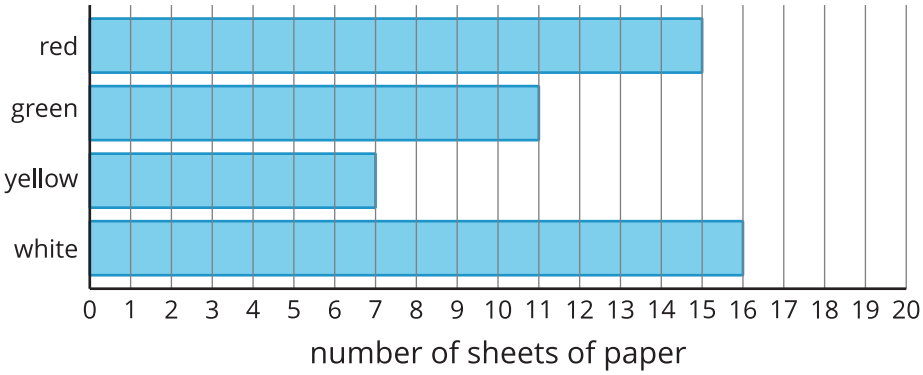
Standards Alignments

Addressing 2.MD.D.10

Narrative

Students subtract numbers in a data context reading the information from a bar graph. Students may select answer A if they compare red and green sheets of paper which are next to one another on the graph. They may select answer B if they make a small error in their counting or calculation. They may select answer D if they add the number of yellow and red sheets of paper rather than using subtraction.

The bar graph shows the number of different color sheets of paper on a desktop.



How many more sheets of red paper are there than sheets of yellow paper?

A. 4

B. 7

C. 8

D. 22

Solution

C

Problem 2

Standards Alignments

Addressing 2.MD.D.10

Narrative

Students are given data in a table and they create a graph. They may choose to make a picture graph or a bar graph. They are given a pre-made template for the graph, though there are no numbers on the left. This invites making a picture graph but they may also make a bar graph. Some students may make an accurate bar graph but forget to put numbers on the left next to the lines.

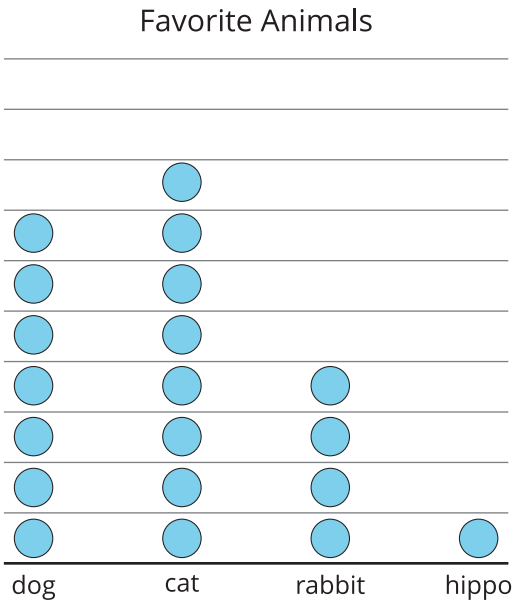
The table shows the favorite animals of some second grade students.

animal	number of students
dog	7
cat	8
rabbit	4
hippo	1

Represent the data shown in the table with a graph. You can make a bar graph or a picture graph.

Solution

Sample response:



Problem 3

Standards Alignments

Addressing 2.OA.B.2

Narrative

Students find the missing value to make equations true. This problem gives students the opportunity to perform arithmetic without needing to consider a context. Students may solve these problems using addition or subtraction.

Find the number that makes each equation true.

a. $7 + _____ = 18$
b. $20 - _____ = 12$
c. $9 + 7 = _____$
d. $19 - 14 = _____$

Solution

a. 11
b. 8
c. 16
d. 5

Problem 4

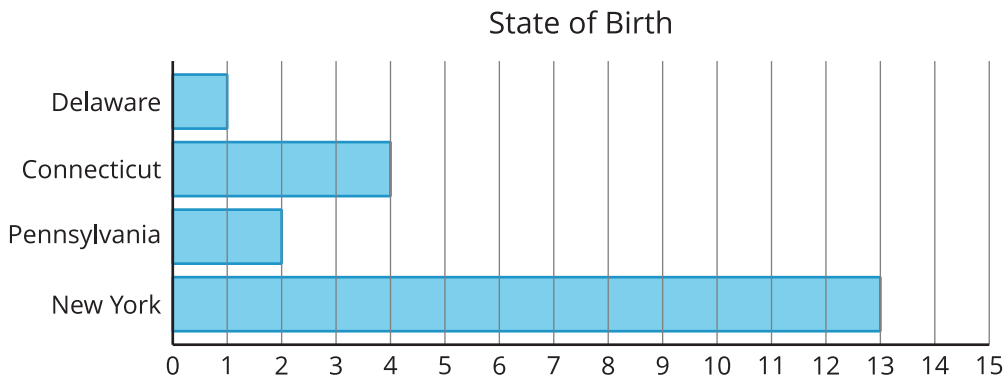
Standards Alignments

Addressing 2.MD.D.10

Narrative

Students are provided information in a bar graph. They will need to read the bar graph accurately and solve addition and subtraction problems based on the data.

The bar graph shows the states where the students in a second grade class were born.



a. How many students in the class were born in New York?
b. How many students in the class were born in Pennsylvania or in Connecticut?
c. How many fewer students in the class were born in Connecticut than in New York?

Solution

a. 13
b. 6
c. 9

Problem 5

Standards Alignments

Addressing 2.OA.A.1

Narrative

Students solve a Compare Smaller Unknown story problem. They may subtract by place value without decomposing a ten. Students may find the sum $48 + 26$ instead of the difference if they do not read the problem carefully.

A farmer has 48 chickens on her farm. There are 26 more chickens than there are pigs. How many pigs are there on the farm? Show your thinking using diagrams, numbers, words, or equations.

Solution

There are 22 pigs on the farm because there are 48 chickens and $48 - 26 = 22$.

Problem 6

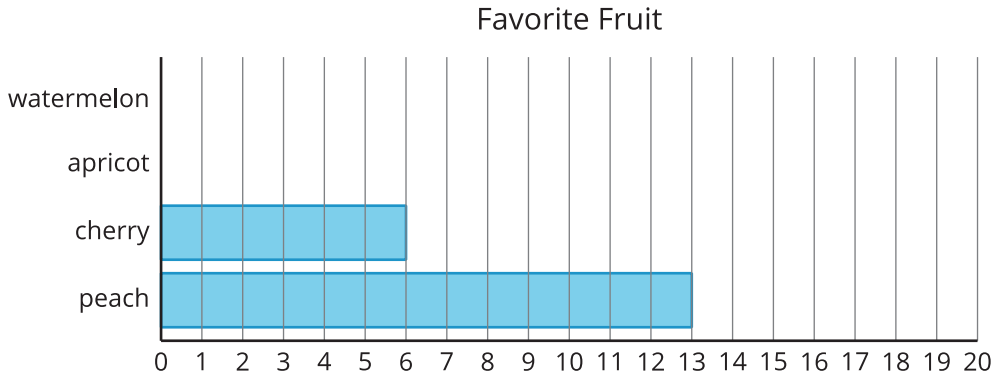
Standards Alignments

Addressing 2.MD.D.10, 2.OA.A.1

Narrative

Students interpret a partially filled in bar graph and then solve problems about and complete the graph. The main arithmetic part of the problem is a Put Together Addend Unknown problem which students may solve by adding on or as a Take From Result Unknown problem.

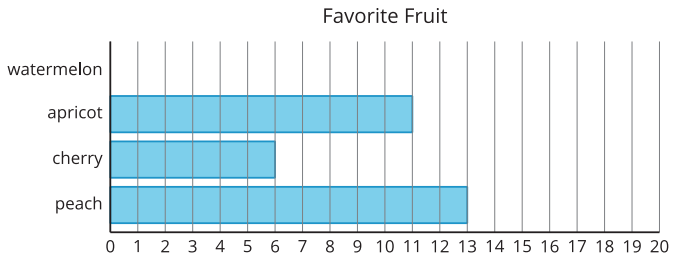
The second grade students at a school chose their favorite summer fruit. The graph shows some of their choices.



a. How many second graders chose cherry or peach?
b. 11 students chose apricot. Show this on the graph.
c. 29 students chose watermelon or apricot. How many students chose watermelon? Show or explain your reasoning.
d. Show the number of students who chose watermelon on the graph.

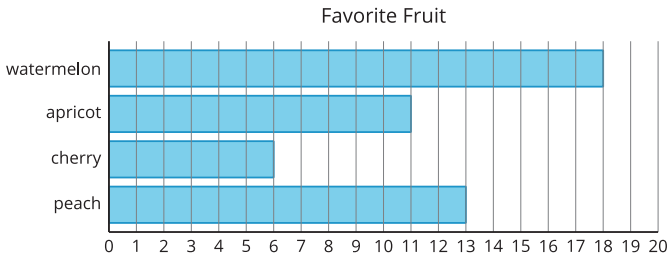
Solution

a. 19
b.



c. 18: I took 10 from 29 and that left 19 and then I took 1 more and that leaves 18.

d.



CKMath™

Core Knowledge MATHEMATICS™

Lesson Cool Downs

Lesson 1: Add and Subtract Within 10

Cool Down: Sums and Differences

1. $4 + 2 =$ _____

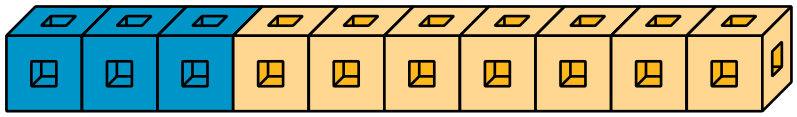
2. $9 - 3 =$ _____

3. Circle the expressions that have a value of 10.

$4 + 6$ $2 + 7$ $8 + 1$ $5 + 5$ $7 + 3$

Lesson 2: Relate Addition and Subtraction within 10

Cool Down: Represent the Cubes



Circle the **2** equations that represent the cubes.

$7 + _____ = 10$

$10 + 3 = _____$

$3 + _____ = 7$

$10 - 3 = _____$

Lesson 3: Relate Addition and Subtraction within 20

Cool Down: Which Equations Are True?

Find the number that makes each equation true.

1. _____ $+ 17 = 20$

2. $20 - 9 =$ _____

3. _____ $+ 5 = 20$

4. $20 -$ _____ $= 8$

Lesson 4: Add and Subtract Your Way

Cool Down: Sums and Differences

Find the value of each expression. Show your thinking using drawings, numbers, or words.

1. $8 + 6$

2. $13 - 5$

3. $16 - 4$

Lesson 5: Add Within 50

Cool Down: What's the Value of the Sum?

Find the value of each sum. Show your thinking using drawings, numbers, or words.

1. $26 + 6$

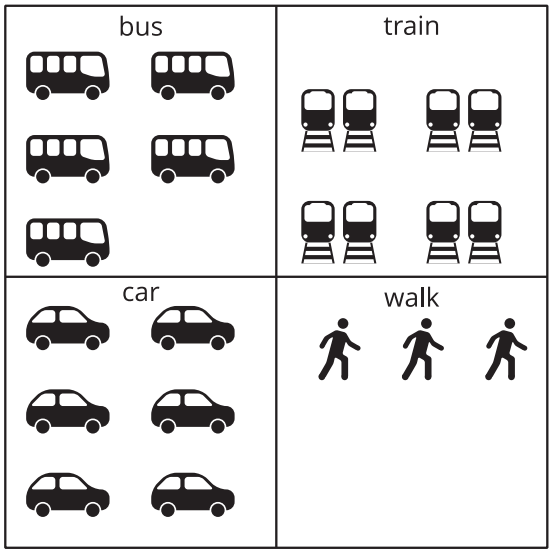
2. $32 + 17$

3. $28 + 14$

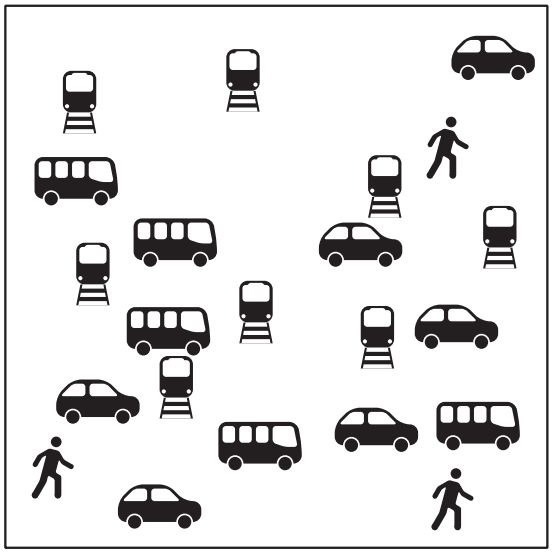
Lesson 7: Collect and Represent Data

Cool Down: Organize Data

Mai and Priya showed how the students in their class traveled to school.



Mai's way



Priya's way

How are Mai's way and Priya's way the same? How are they different?

Lesson 8: Interpret Picture Graphs

Cool Down: Use a Picture Graph

A group of students were asked, “What is your favorite pet?” Their responses are shown in this picture graph.

1. Circle the 2 questions that can be answered by the picture graph.

   A. How many students chose a cat as their favorite pet?

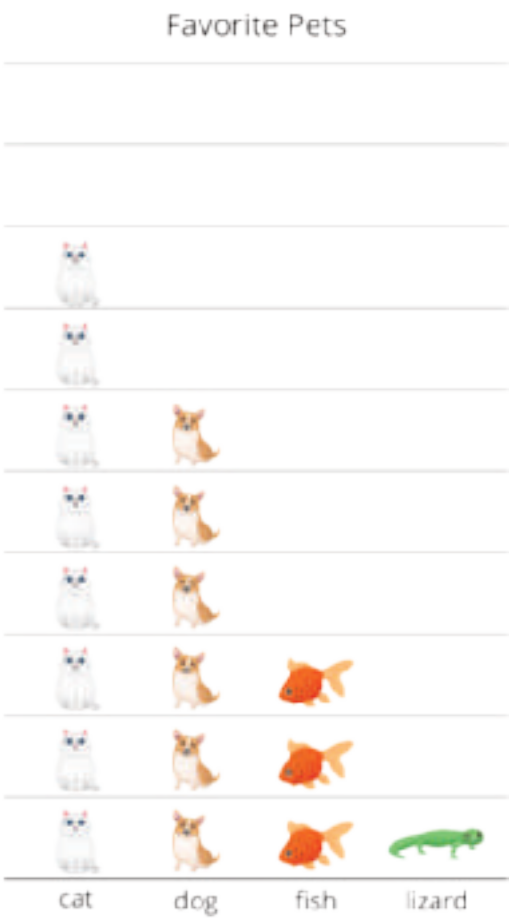
   B. How many more students like rabbits than dogs?

   C. Who owns a lizard?

   D. How many more students chose cats than dogs?

   E. Why don’t more students like dogs?

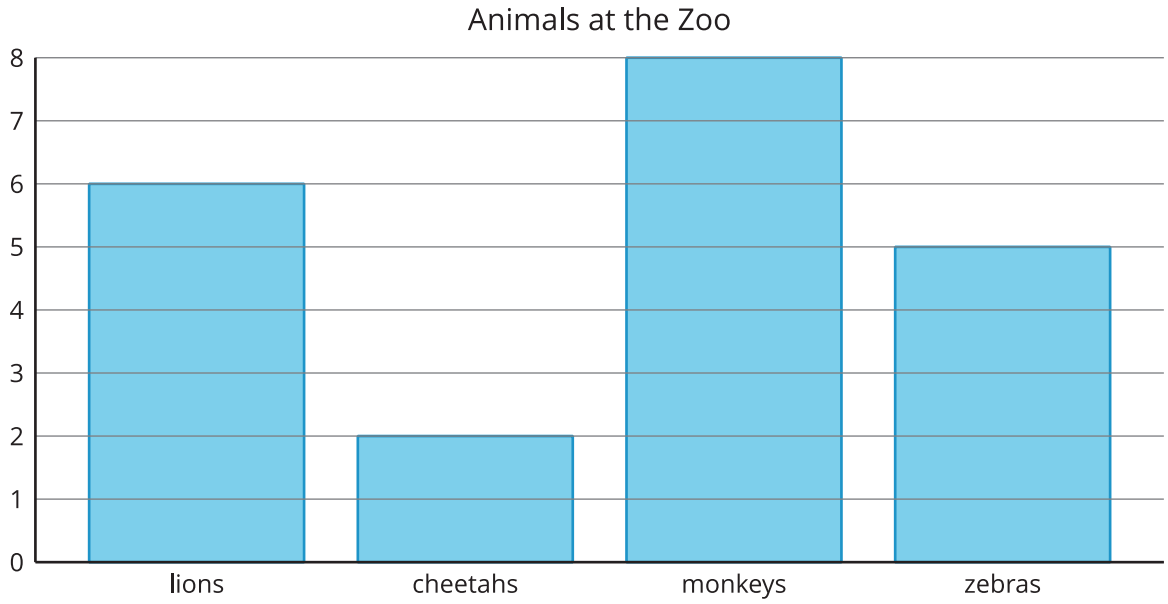
2. Pick a question that can't be answered by the data on the graph. Explain why it can’t be answered.



Lesson 9: Interpret Bar Graphs

Cool Down: Animals at the Zoo

A zookeeper counted the number of lions, cheetahs, monkeys, and zebras at the zoo. The zookeeper's data is shown in this bar graph.



1. How many monkeys were at the zoo? _____

2. How many lions were at the zoo? _____

3. What is the total number of cheetahs and zebras? _____

Lesson 10: Represent Data Using Picture Graphs and Bar Graphs

Cool Down: Fruits We Love Graphs

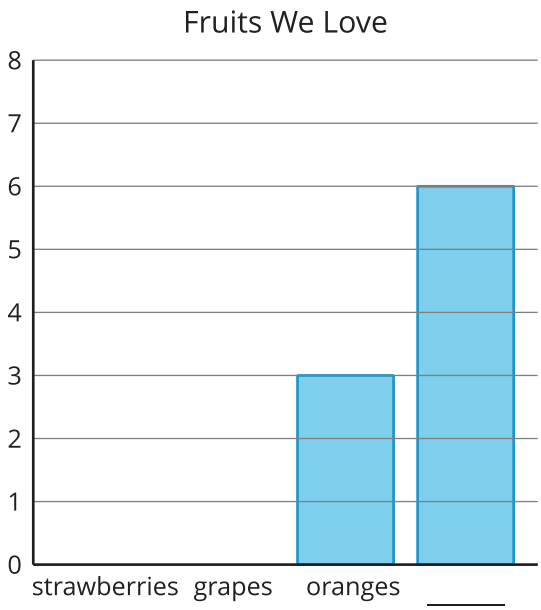
Mr. Green asked the soccer team, “What fruits do you love to eat?”

Mai and Lin used the data he collected to make graphs.
Mai started a picture graph. Lin started a bar graph.

Complete each graph.

Mai's Graph

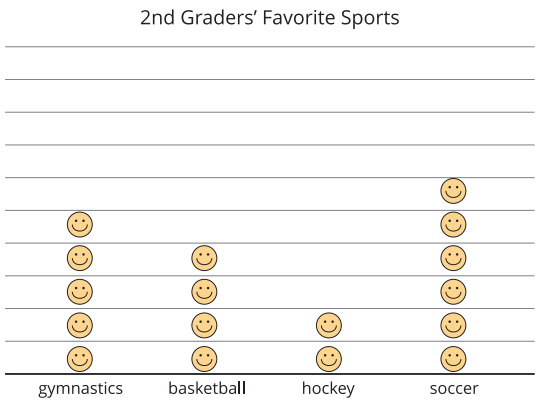
Lin's Graph

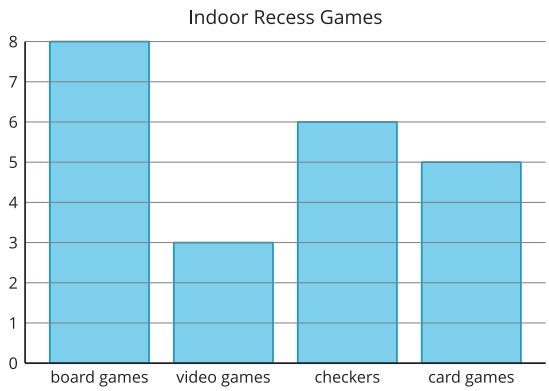


Lesson 11: Questions About Data

Cool Down: Questions About Data

Students were asked, “What is your favorite sport to play?” and “What indoor recess game do you like to play?” Their responses are shown in the picture graph and bar graph.





1. How many students like to play soccer? _____

2. How many students like to play board games? _____

3. Which graph was used to represent the number of students who like basketball?

   Circle one: Picture Graph Bar Graph

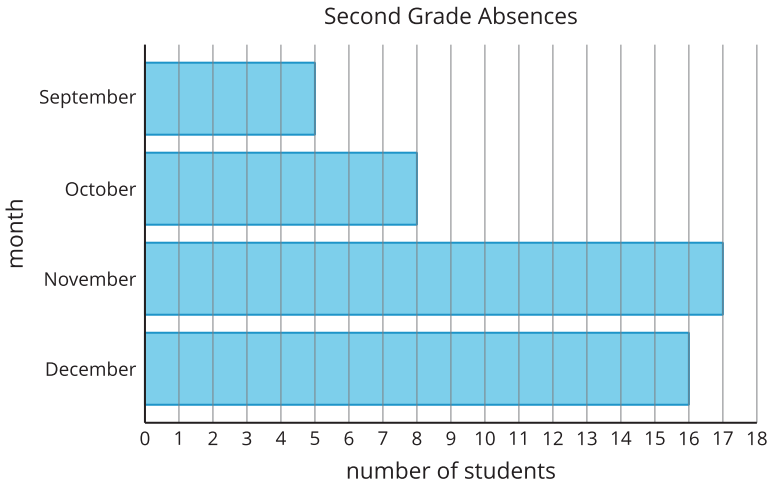
4. Which graph is about indoor games?

   Circle one: Picture Graph Bar Graph

Lesson 13: Use Bar Graphs to Compare

Cool Down: Second Grade Absences

The school collected attendance data to see how many second graders were absent each month from September to December. The data is shown in this bar graph.



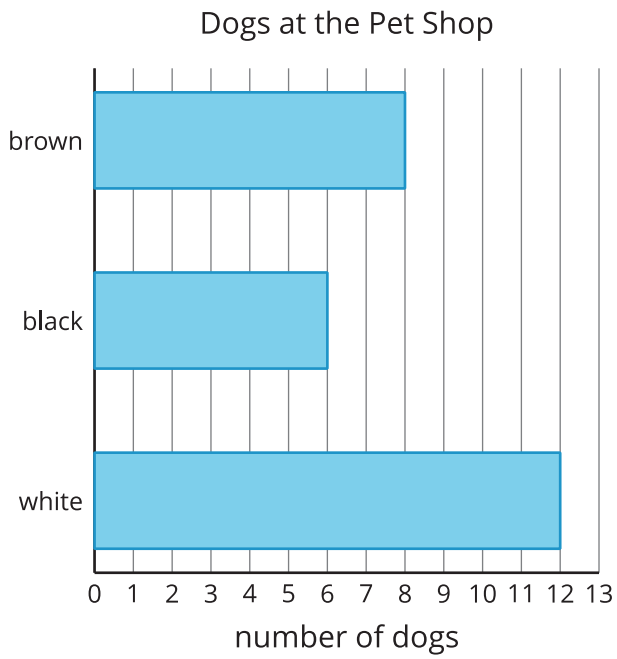
1. How many fewer students were absent in October than in November? Show your thinking using drawings, numbers, or words.

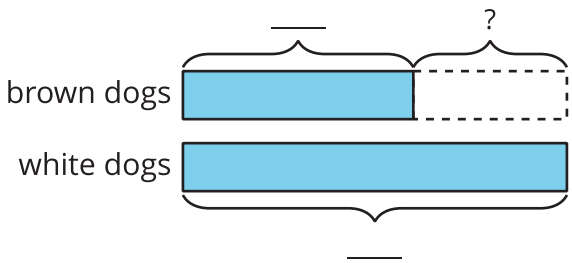
2. Write an equation to show how you found the difference. Can you write another equation that shows how to find the difference?

Lesson 14: Use Diagrams to Compare

Cool Down: Dogs at the Pet Shop

These two representations show the same data about dogs at a pet store.





1. Use the bar graph to fill in the boxes on the diagram.

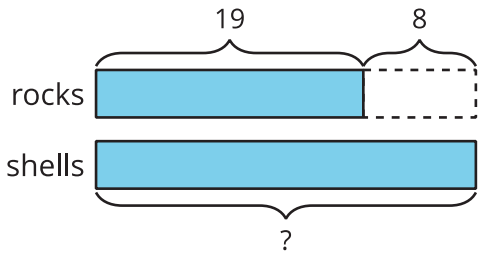
2. How many more white dogs than brown dogs are there? Show your thinking using drawings, numbers, or words.

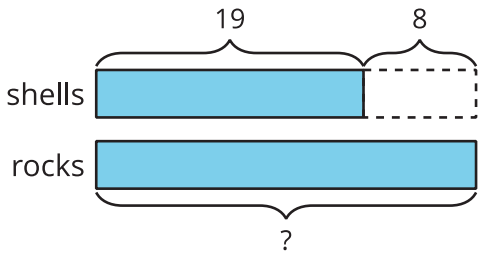
Lesson 15: Diagrams with All Kinds of Compare Problems

Cool Down: At the Beach

Children found shells and rocks at the beach. They found 8 more shells than rocks. They found 19 rocks. How many shells did the children find?

1. Circle the diagram that matches the story problem.





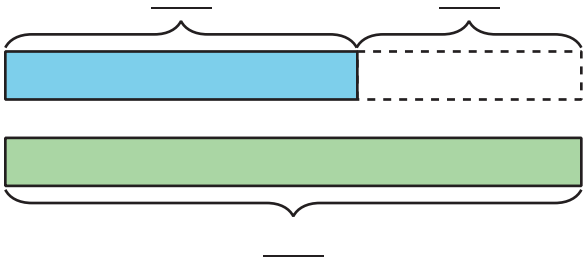
2. Explain how you know the diagram matches the story.

Lesson 16: Solve All Kinds of Compare Problems

Cool Down: Compare the Pages

Jada read 17 pages. Noah read 9 more pages than Jada. How many pages did Noah read?

Show your thinking using drawings, numbers, words, or an equation. If it helps, you can use the diagram.



CKMath™

Core Knowledge MATHEMATICS™

Instructional Masters

Instructional Masters for Adding, Subtracting, and Working with Data

address	title	students per copy	written on?	requires cutting?	card stock recommended?	color paper recommended?
Activity Grade2.1.10.1	Picture and Bar Graph Template	1	yes	no	no	no
Activity Grade2.1.10.2	Picture and Bar Graph Template	1	yes	no	no	no
Activity Grade2.1.18.1	Picture and Bar Graph Template	1	yes	no	no	no
Activity Grade2.1.3.1	What's Behind My Back Stage 3 Recording Sheet	1	yes	no	no	no
Center	What's Behind My Back Stage 3 Recording Sheet	1	yes	no	no	no
Activity Grade2.1.17.1	10-Frame Standard	1	no	no	yes	no
Activity Grade2.1.6.1	Number Puzzles Digit Cards	2	no	yes	no	no
Center	Number Puzzles Digit Cards	2	no	yes	no	no
Center	Number Puzzles Digit Cards	2	no	yes	no	no
Activity Grade2.1.5.1	How Close? Stage 3 Recording Sheet	1	yes	no	no	no
Center	How Close? Stage 3 Recording Sheet	1	yes	no	no	no
Activity Grade2.1.15.2	Card Sort: At the Beach	2	no	yes	no	no
Activity Grade2.1.10.1	Data Tables	6	no	yes	no	no

Activity Grade2.1.2.1	What's Behind My Back Stage 2 Recording Sheet Grade 1	1	yes	no	no	no
Center	What's Behind My Back Stage 2 Recording Sheet Grade 1	1	yes	no	no	no
Activity Grade2.1.4.1	How Close? Stage 1 Recording Sheet	1	yes	no	no	no
Center	How Close? Stage 1 Recording Sheet	1	yes	no	no	no
Activity Grade2.1.14.1	Party Time	1	no	no	no	no
Activity Grade2.1.17.1	Counting Collections Stage 3 Recording Sheet	1	yes	no	no	no
Center	Counting Collections Stage 3 Recording Sheet	1	yes	no	no	no
Activity Grade2.1.6.1	Number Puzzles Addition and Subtraction Stage 2 Gameboard	1	no	no	no	no
Center	Number Puzzles Addition and Subtraction Stage 2 Gameboard	1	no	no	no	no
Activity Grade2.1.7.1	How We Get to School	1	yes	yes	no	no
Activity Grade2.1.12.1	Sort and Display Stage 2 Recording Sheet	1	yes	no	no	no
Center	Sort and Display Stage 2 Recording Sheet	1	yes	no	no	no
Activity Grade2.1.1.1	Number Cards (0-10)	2	no	yes	yes	no
Center	Number Puzzles Addition and Subtraction Stage 1 Gameboard	2	no	no	no	no
Center	What's Behind My Back Stage 2 Recording Sheet Kindergarten	1	yes	no	no	no

Center	How Close? Stage 2 Recording Sheet	1	yes	no	no	no
Center	Sort and Display Stage 1 Recording Sheet	1	yes	no	no	no
Center	Shake and Spill Stage 4 and 5 Recording Sheet (G1 and 2)	1	yes	no	no	no

Picture and Bar Graph Template

Picture and Bar Graph Template

Picture and Bar Graph Template

What’s Behind My Back Stage 3 Recording Sheet

Directions:

- Start with 2 towers of 10 cubes.
- Partner A: Put the towers behind your back, and break off some cubes. Show your partner the rest of the tower.
- Partner B: Record an addition equation with a blank to represent the cubes.
- Partner A: Ask "How many are behind my back? How do you know?"
- Switch roles and repeat.

	+		=	
	+		=	
	+		=	
	+		=	

What’s Behind My Back Stage 3 Recording Sheet

	+		=	
	+		=	
	+		=	
	+		=	
	+		=	
	+		=	

What’s Behind My Back Stage 3 Recording Sheet

Directions:

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- Partner B: Record an addition equation with a blank to represent the cubes.
- Partner A: Ask "How many are behind my back? How do you know?"
- Switch roles and repeat.

	+		=	
	+		=	
	+		=	
	+		=	

What’s Behind My Back Stage 3 Recording Sheet

	+		=	
	+		=	
	+		=	
	+		=	
	+		=	
	+		=	

10-Frame Standard

Number Puzzles Digit Cards

0	1	2	3	4	5	6	7	8	9
0	1	2	3	4	5	6	7	8	9
0	1	2	3	4	5	6	7	8	9
0	1	2	3	4	5	6	7	8	9
0	1	2	3	4	5	6	7	8	9
0	1	2	3	4	5	6	7	8	9
0	1	2	3	4	5	6	7	8	9

Number Puzzles Digit Cards

0	1	2	3	4	5	6	7	8	9
0	1	2	3	4	5	6	7	8	9
0	1	2	3	4	5	6	7	8	9
0	1	2	3	4	5	6	7	8	9
0	1	2	3	4	5	6	7	8	9
0	1	2	3	4	5	6	7	8	9
0	1	2	3	4	5	6	7	8	9

Number Puzzles Digit Cards

0	1	2	3	4	5	6	7	8	9
0	1	2	3	4	5	6	7	8	9
0	1	2	3	4	5	6	7	8	9
0	1	2	3	4	5	6	7	8	9
0	1	2	3	4	5	6	7	8	9
0	1	2	3	4	5	6	7	8	9
0	1	2	3	4	5	6	7	8	9

How Close? Stage 3 Recording Sheet

Directions:

- Each partner:
  - Take 7 cards.
  - Choose 4 cards to make 2 two-digit numbers.
  - Write an equation to show the sum of the numbers you made.
  - Compare sums with your partner, whoever is closer to 100 wins a point.
- Take 4 new cards and start the next round.

☐☐ + ☐☐ = _____

☐☐ + ☐☐ = _____

☐☐ + ☐☐ = _____

☐☐ + ☐☐ = _____

How Close? Stage 3 Recording Sheet

		+			= _____
		+			= _____
		+			= _____
		+			= _____
		+			= _____

How Close? Stage 3 Recording Sheet

Directions:

- Each partner:
  - Take 7 cards.
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  - Compare sums with your partner, whoever is closer to 100 wins a point.
- Take 4 new cards and start the next round.

☐☐ + ☐☐ = _____

☐☐ + ☐☐ = _____

☐☐ + ☐☐ = _____

☐☐ + ☐☐ = _____

How Close? Stage 3 Recording Sheet

		+			= _____
		+			= _____
		+			= _____
		+			= _____
		+			= _____

Card Sort: At the Beach

Card Sort: At the Beach
A

Lin found 28 more shells than Diego.
Diego found 32 shells.
How many shells did Lin find?

Card Sort: At the Beach
B

Lin counted 28 boats.
Diego counted 32 boats.
How many more boats did Diego count?

Card Sort: At the Beach
C

Lin saw 32 starfish.
Diego saw 28 fewer starfish than Lin.
How many starfish did Diego see?

Card Sort: At the Beach
D

Lin found 40 fewer crabs than Diego.
Diego found 57 crabs.
How many crabs did Lin find?

Card Sort: At the Beach
E

Lin counted 57 beach chairs.
She counted 40 more people than chairs.
How many people did she count?

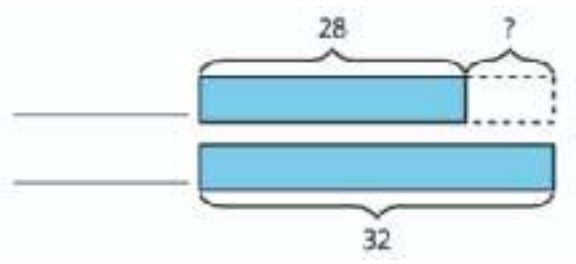
Card Sort: At the Beach
F

Diego saw 40 seagulls.
Lin saw 57 seagulls.
How many fewer seagulls did Diego see?

Card Sort: At the Beach

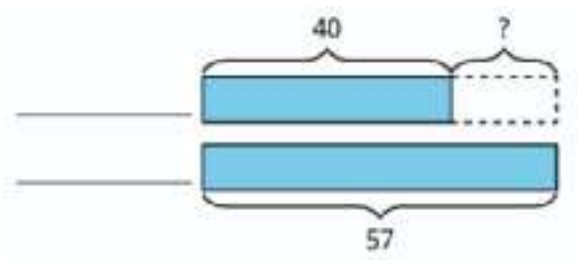
Card Sort: At the Beach

G



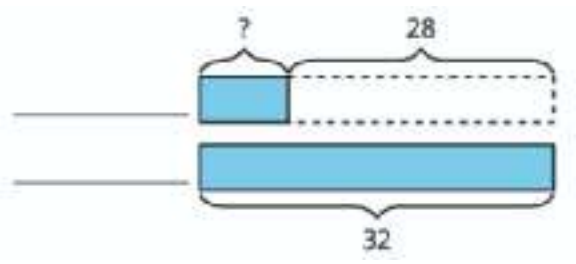
Card Sort: At the Beach

H



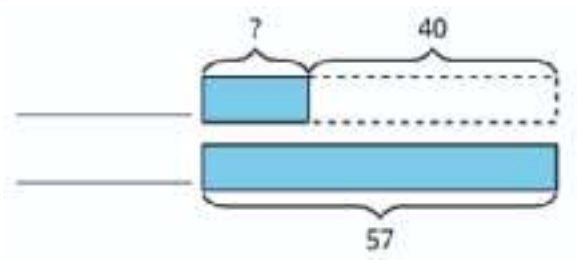
Card Sort: At the Beach

I



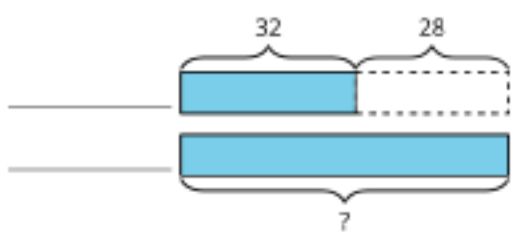
Card Sort: At the Beach

J



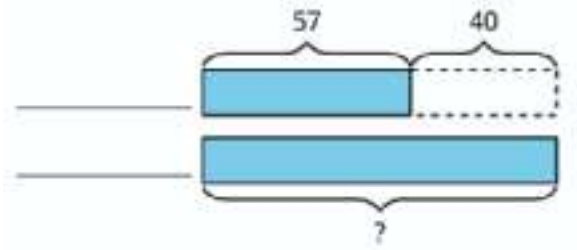
Card Sort: At the Beach

K



Card Sort: At the Beach

L



Card Sort: At the Beach

Card Sort: At the Beach
M

$$32 - 28 = ?$$

Card Sort: At the Beach
N

$$57 - 40 = ?$$

Card Sort: At the Beach
O

$$28 + ? = 32$$

Card Sort: At the Beach
P

$$40 + ? = 57$$

Card Sort: At the Beach
Q

$$32 + 28 = ?$$

Card Sort: At the Beach
R

$$57 + 40 = ?$$

Data Tables

Table 1

Favorite Sports

basketball	4
softball	3
gymnastics	5
soccer	11

Data Tables

Table 2

Lunch Choices

peanut butter and jelly	6
macaroni and cheese	4
chicken nuggets	8
spaghetti	5

Data Tables

Table 3

Favorite Dessert

cake	6
ice cream	9
cookies	2
brownies	4

Data Tables

Table 4

Coins in a Jar

quarters	4
nickels	10
dimes	5
pennies	4

Data Tables

Table 5

Vehicles on the Road

bus	4
truck	5
car	8
motorcycle	3

Data Tables

Table 6

Recess Activities

swings	9
jump rope	7
basketball	4
tag	3

What’s Behind My Back Stage 2 Recording Sheet Grade 1

Directions:

- Start with a tower of 10 cubes.
- Partner A: Put the tower behind your back, and break off some cubes. Show your partner the rest of the tower.
- Partner B: Record an addition equation with a blank to represent the missing cubes.
- Partner A: Ask "How many are behind my back? How do you know?"
- Switch roles and repeat.

____ + ____ = ____

____ + ____ = ____

____ + ____ = ____

____ + ____ = ____

What’s Behind My Back Stage 2 Recording Sheet Grade 1

	+		=	
	+		=	
	+		=	
	+		=	
	+		=	
	+		=	

What’s Behind My Back Stage 2 Recording Sheet Grade 1

Directions:

- Start with a tower of 10 cubes.
- Partner A: Put the tower behind your back, and break off some cubes. Show your partner the rest of the tower.
- Partner B: Record an addition equation with a blank to represent the missing cubes.
- Partner A: Ask "How many are behind my back? How do you know?"
- Switch roles and repeat.

____ + ____ = ____

____ + ____ = ____

____ + ____ = ____

____ + ____ = ____

What’s Behind My Back Stage 2 Recording Sheet Grade 1

	+		=	
	+		=	
	+		=	
	+		=	
	+		=	
	+		=	

How Close? Stage 1 Recording Sheet

Directions:

- Each partner:
  - Take 5 cards.
  - Choose 3 numbers.
  - Write an equation to show the sum of the 3 numbers.
  - Compare sums with your partner, whoever is closer to 20 wins a point.
- Take 3 new cards and start the next round.

____ + ____ + ____ = _____

____ + ____ + ____ = _____

____ + ____ + ____ = _____

____ + ____ + ____ = _____

How Close? Stage 1 Recording Sheet

____ + ____ + ____ = _____

____ + ____ + ____ = _____

____ + ____ + ____ = _____

____ + ____ + ____ = _____

How Close? Stage 1 Recording Sheet

Directions:

- Each partner:
  - Take 5 cards.
  - Choose 3 numbers.
  - Write an equation to show the sum of the 3 numbers.
  - Compare sums with your partner, whoever is closer to 20 wins a point.
- Take 3 new cards and start the next round.

____ + ____ + ____ = _____

____ + ____ + ____ = _____

____ + ____ + ____ = _____

____ + ____ + ____ = _____

How Close? Stage 1 Recording Sheet

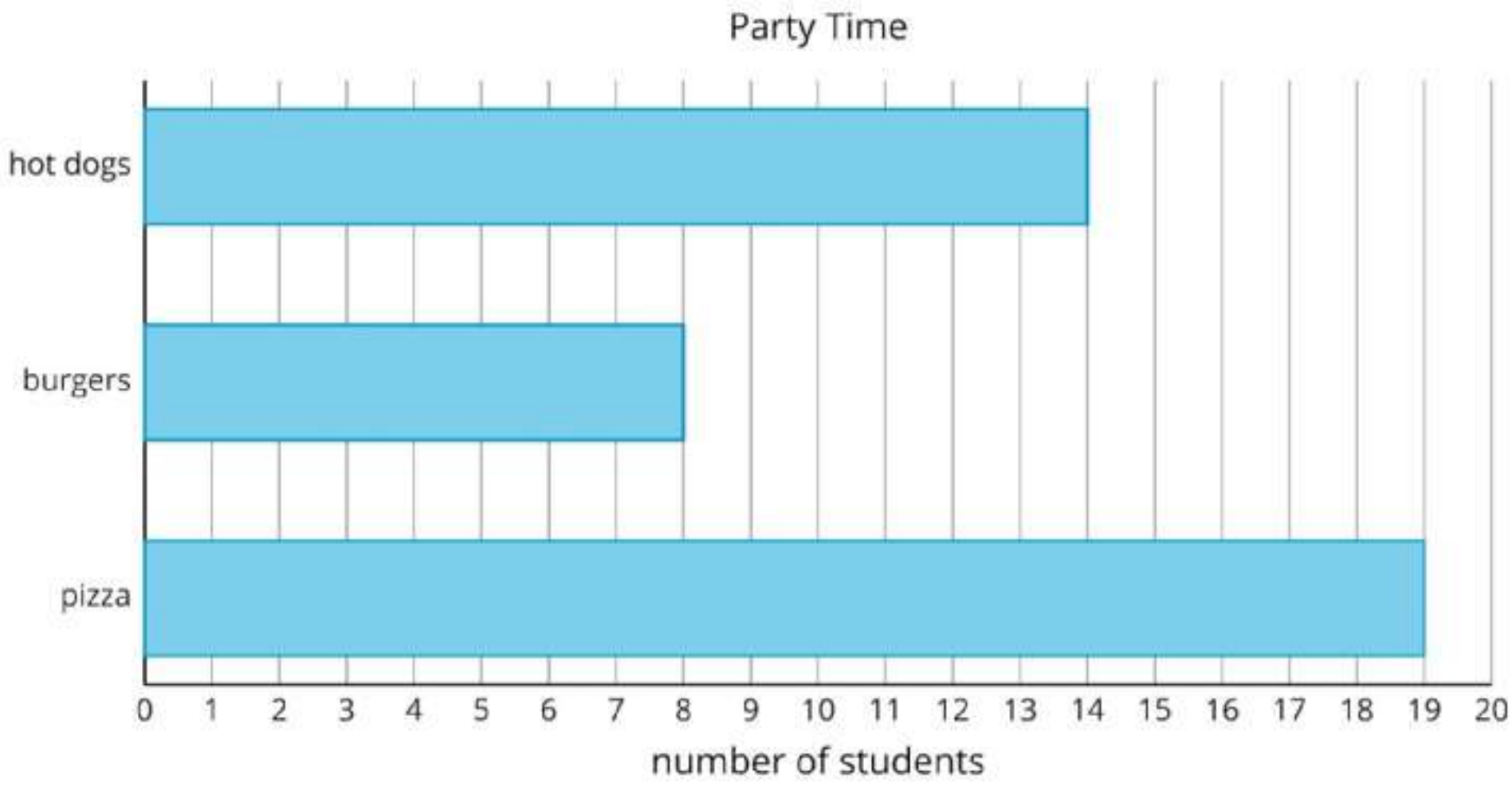
____ + ____ + ____ = _____

____ + ____ + ____ = _____

____ + ____ + ____ = _____

____ + ____ + ____ = _____

Party Time


Party Time
hot dogs
burgers
pizza
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
number of students

Counting Collections Stage 3 Recording Sheet

Directions:

1. Record an estimate that is:

too low	about right	too high

2. Count your collection. Show how you counted.

Counting Collections Stage 3 Recording Sheet

Directions:

1. Record an estimate that is:

too low	about right	too high

2. Count your collection. Show how you counted.

Puzzle 1

Make each equation true. Use number cards 0–9.

11 = ☐ + ☐	11 = 1☐ - ☐
11 = 1☐ + ☐	11 = 1☐ - 2
11 = 1☐ - 8	11 = 1☐ - 1

Puzzle 2

Make each equation true. Use number cards 0–9.

14 = 1 ☐ + ☐	14 = ☐ + 7
14 = 8 + ☐	14 = 1 ☐ - 4
14 = 1 ☐ - ☐	14 = 1 ☐ - ☐

Puzzle 3

Make each equation true. Use number cards 0–9.

17 = 1 ☐ + ☐	17 = 1 ☐ - ☐
17 = 1 ☐ - ☐	17 = 1 + 1 ☐
17 = 1 ☐ - 1	17 = 1 ☐ + 2

Puzzle 4

Make each equation true. Use number cards 0–9.

18 = 1 ☐ + ☐	18 = 1 ☐ - ☐
18 = 1 ☐ + ☐	18 = 1 ☐ + 4
18 = 1 ☐ + ☐	18 = 1 ☐ - 1

Puzzle 5

Make each equation true. Use number cards 0–9.

19 = 1 ☐ + ☐	19 = 1 ☐ + ☐
19 = 1 ☐ + 3	19 = 1 ☐ + 6
19 = 1 ☐ - ☐	19 = 1 ☐ + 1

Puzzle 1

Make each equation true. Use number cards 0–9.

11 = ☐ + ☐	11 = 1☐ - ☐
11 = 1☐ + ☐	11 = 1☐ - 2
11 = 1☐ - 8	11 = 1☐ - 1

Puzzle 2

Make each equation true. Use number cards 0–9.

14 = 1 ☐ + ☐	14 = ☐ + 7
14 = 8 + ☐	14 = 1 ☐ - 4
14 = 1 ☐ - ☐	14 = 1 ☐ - ☐

Puzzle 3

Make each equation true. Use number cards 0–9.

17 = 1 ☐ + ☐	17 = 1 ☐ - ☐
17 = 1 ☐ - ☐	17 = 1 + 1 ☐
17 = 1 ☐ - 1	17 = 1 ☐ + 2

Puzzle 4

Make each equation true. Use number cards 0–9.

18 = 1 ☐ + ☐	18 = 1 ☐ - ☐
18 = 1 ☐ + ☐	18 = 1 ☐ + 4
18 = 1 ☐ + ☐	18 = 1 ☐ - 1

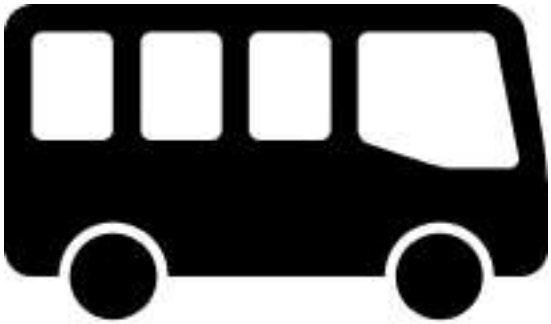
Puzzle 5

Make each equation true. Use number cards 0–9.

19 = 1 ☐ + ☐	19 = 1 ☐ + ☐
19 = 1 ☐ + 3	19 = 1 ☐ + 6
19 = 1 ☐ - ☐	19 = 1 ☐ + 1

How We Get to School

train



bus

car

walk

Sort and Display Stage 2 Recording Sheet

Directions:

- Choose 3 categories to sort your objects into.
- Make a picture graph or bar graph to show how you sorted.
- Ask your partner 2 questions that can be answered based on your graph.

Sort and Display Stage 2 Recording Sheet

Directions:

- Choose 3 categories to sort your objects into.
- Make a picture graph or bar graph to show how you sorted.
- Ask your partner 2 questions that can be answered based on your graph.

Number Cards (0-10)

1	2
3	4
5	6

Number Cards (0-10)

7	8
9	1
2	3

Number Cards (0-10)

4	5
6	7
8	9

Number Cards (0-10)

0	0
10	10

Puzzle 1

Make each equation true. Use number cards 0–9.

6= ☐ + ☐	6= ☐ + ☐
6= ☐ - ☐	6= ☐ - 2
6= ☐ - ☐	6= ☐ - 1

Puzzle 2

Make each equation true. Use number cards 0–9.

7= ☐ + ☐	7= ☐ + ☐
7= ☐ - ☐	7= ☐ - 2
7= ☐ + ☐	7= ☐ - 1

Puzzle 3

Make each equation true. Use number cards 0–9.

8= ☐ + ☐	8= ☐ + ☐
8= ☐ - 0	8= ☐ - 1
8= ☐ + ☐	Leftovers: ☐ ☐

Puzzle 4

Make each equation true. Use number cards 0–9.

9= ☐ + ☐	9= ☐ + ☐
9= ☐ + ☐	9= ☐ + ☐
9= ☐ + ☐	Leftovers: ☐ ☐

Puzzle 5

Make each equation true. Use number cards 0–9.

10= ☐ + 5	10= ☐ + ☐
10= 8 + ☐	10= ☐ + ☐
10= ☐ + 2	Leftovers: ☐ ☐

What’s Behind My Back Stage 2 Recording Sheet Kindergarten

10 = ____ + ____

10 = ____ + ____

10 = ____ + ____

10 = ____ + ____

10 = ____ + ____

What's Behind My Back Stage 2 Recording Sheet Kindergarten

10 = ____ + ____

10 = ____ + ____

10 = ____ + ____

10 = ____ + ____

10 = ____ + ____

How Close? Stage 2 Recording Sheet

Directions:

- Each partner:
  - Take 4 cards.
  - Choose 2 or 3 numbers to subtract from 20.
  - Write an equation to show the difference when you subtract the numbers from 20.
  - Compare differences with your partner, whoever is closer to 0 wins a point.
- Take 2 or 3 new cards and start the next round.

20 - ☐ - ☐ - ☐ = _____

20 - ☐ - ☐ - ☐ = _____

20 - ☐ - ☐ - ☐ = _____

20 - ☐ - ☐ - ☐ = _____

How Close? Stage 2 Recording Sheet

20 - ☐ - ☐ - ☐ = _____

20 - ☐ - ☐ - ☐ = _____

20 - ☐ - ☐ - ☐ = _____

20 - ☐ - ☐ - ☐ = _____

20 - ☐ - ☐ - ☐ = _____

Sort and Display Stage 1 Recording Sheet

Directions:

- Choose 2 or 3 categories to sort your objects into.
- Show how you sorted.
- Show what you made to a partner. Ask them a question about how you sorted.

Shake and Spill Stage 4 and 5 Recording Sheet (G1 and 2)

Directions:

- Choose how many counters to put in the cup.
- Partner A: Close your eyes.
- Partner B: Shake and spill. Cover up the yellow counters with the cup.
- Partner A: Open your eyes and figure out how many counters are under the cup.
- Partner B: Show how many.
- Both partners: Record an equation.
- Switch roles and start the next round.

round:	Write an equation to represent the red and yellow counters.
1	
2	
3	
4	
5	
6	
7	
8	

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