FL State Adoption Bid # 3671

Teacher Edition

Eureka Math Grade 2 Modules 1 & 2

Special thanks go to the Gordon A. Cain Center and to the Department of Mathematics at Louisiana State University for their support in the development of *Eureka Math*.

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Published by Great Minds®.

Printed in the U.S.A.
This book may be purchased from the publisher at eureka-math.org.
10 9 8 7 6 5 4 3 2 1

ISBN 978-1-64054-318-8

G2-M1-M2-UTE-1.3.0-05.2018

Eureka Math: A Story of Units **Contributors**

Katrina Abdussalaam, Curriculum Writer
Tiah Alphonso, Program Manager—Curriculum Production
Kelly Alsup, Lead Writer / Editor, Grade 4
Catriona Anderson, Program Manager—Implementation Support
Debbie Andorka-Aceves, Curriculum Writer
Eric Angel, Curriculum Writer
Leslie Arceneaux, Lead Writer / Editor, Grade 5
Kate McGill Austin, Lead Writer / Editor, Grades PreK–K
Adam Baker, Lead Writer / Editor, Grade 5
Scott Baldridge, Lead Mathematician and Lead Curriculum Writer
Beth Barnes, Curriculum Writer
Bonnie Bergstresser, Math Auditor
Bill Davidson, Fluency Specialist
Jill Diniz, Program Director
Nancy Diorio, Curriculum Writer
Nancy Doorey, Assessment Advisor
Lacy Endo-Peery, Lead Writer / Editor, Grades PreK–K
Ana Estela, Curriculum Writer
Lessa Faltermann, Math Auditor
Janice Fan, Curriculum Writer
Ellen Fort, Math Auditor
Peggy Golden, Curriculum Writer
Maria Gomes, Pre-Kindergarten Practitioner
Pam Goodner, Curriculum Writer
Greg Gorman, Curriculum Writer
Melanie Gutierrez, Curriculum Writer
Bob Hollister, Math Auditor
Kelley Isinger, Curriculum Writer
Nuhad Jamal, Curriculum Writer
Mary Jones, Lead Writer / Editor, Grade 4
Halle Kananak, Curriculum Writer
Susan Lee, Lead Writer / Editor, Grade 3
Jennifer Loftin, Program Manager—Professional Development
Soo Jin Lu, Curriculum Writer

Ben McCarty, Lead Mathematician / Editor, PreK–5
Stacie McClintock, Document Production Manager
Cristina Metcalf, Lead Writer / Editor, Grade 3
Susan Midlarsky, Curriculum Writer
Pat Mohr, Curriculum Writer
Sarah Oyler, Document Coordinator
Victoria Peacock, Curriculum Writer
Jenny Petrosino, Curriculum Writer
Terrie Poehl, Math Auditor
Robin Ramos, Lead Curriculum Writer / Editor, PreK–5
Kristen Riedel, Math Audit Team Lead
Cecilia Rudzitis, Curriculum Writer
Tricia Salerno, Curriculum Writer
Chris Sarlo, Curriculum Writer
Ann Rose Sentoro, Curriculum Writer
Colleen Sheeron, Lead Writer / Editor, Grade 2
Gail Smith, Curriculum Writer
Shelley Snow, Curriculum Writer
Robyn Sorenson, Math Auditor
Kelly Spinks, Curriculum Writer
Marianne Strayton, Lead Writer / Editor, Grade 1
Theresa Streeter, Math Auditor
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Table of Contents

GRADE 2 • MODULE 1

Sums and Differences to 100

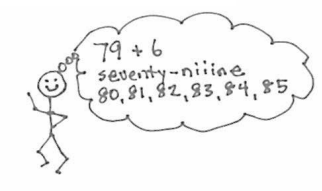
Grade 2 • Module 1

Sums and Differences to 100

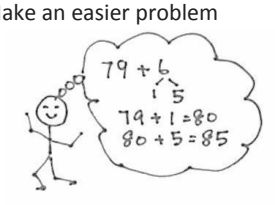
OVERVIEW

Module 1 sets the foundation for students to master sums and differences to 20. Students subsequently apply these skills to fluently add one-digit to two-digit numbers at least through 100 using place value understanding, properties of operations, and the relationship between addition and subtraction. In Grade 1, students worked extensively with numbers to gain fluency with sums and differences within 10 and became proficient in counting on. They also began to make easier problems to add and subtract within 20 and 100 by making ten and taking from ten.

Count on



Make an easier problem



In Module 1, students advance from Grade 1's subtraction of a multiple of ten to a new complexity, subtracting single-digit numbers from both multiples of ten (e.g., 40 – 9) and from any two-digit number within 100 (e.g., 41 – 9).

40 – 9 = 31
/ \
30 10

10 – 9 = 1
30 + 1 = 31

41 – 9 = 32
/ \
31 10

10 – 9 = 1
31 + 1 = 32

Topic A's two lessons are devoted solely to the important practice of fluency, the first lesson working within 20 and the second extending the same fluencies to numbers within 100. Topic A reactivates students' Kindergarten and Grade 1 learning as they energetically practice the following prerequisite skills for decomposition and composition methods:

- decompositions of numbers within ten (e.g., 0 + 7, 1 + 6, 2 + 5, and 3 + 4, all equal seven).
- partners to ten (e.g., 10 and 0, 9 and 1, 8 and 2, 7 and 3, 6 and 4, 5 and 5, and "I know 8 needs 2 to make ten").
- tens plus sums (e.g., 10 + 9, 10 + 8).

For example, students quickly remember make ten facts. They then immediately use those facts to solve problems with larger numbers (e.g., "I know 8 needs 2 to make 10, so 58 needs 2 to make 6 tens or sixty!"). Lessons 1 and 2 include Sprints that bring back automaticity with the *tens plus* sums, which are foundational for adding within 100 and expanded form (e.g., "I know 10 + 8 = 18, so 40 + 8 = 48").

Topic B takes Grade 1's work to a new level of fluency as students make easier problems to add and subtract within 100 by using the number system's base ten structure. The topic begins with students using place value understanding to solve problems by adding and subtracting like units (e.g., "I know 8 – 5 = 3, so 87 – 50 = 37 because 8 tens – 5 tens = 3 tens. I know 78 – 5, too, because 8 ones – 5 ones = 3 ones. I used the same easier problem, 8 – 5 = 3, just with ones instead of tens!"). Students then practice making ten within 20 before generalizing that strategy to numbers within 100 (e.g., "I know 9 + 6 = 15, so 79 + 6 = 85, and 89 + 6 = 95").

The preceding lessons segue beautifully into the new concepts of Topic B, subtracting single-digit numbers from two-digit numbers greater than 20. In Lesson 6, students use the familiar take from ten strategy to subtract single-digit numbers from multiples of ten (e.g., 60 – 8, as shown below). In Lesson 7, students practice taking from ten within 20 when there is the complexity of some ones in the total (e.g., 13 – 8, as shown below). In Lesson 8, they then subtract single-digit numbers from 2-digit numbers within 100 when there are also some ones (e.g., 63 – 8, as shown below).

Lesson 6

60 – 8 = 52
/ \
50 10

10 – 8 = 2
50 + 2 = 52

Lesson 7

13 – 8 = 5
/ \
3 10

10 – 8 = 2
3 + 2 = 5

Lesson 8

63 – 8 = 55
/\
53 10

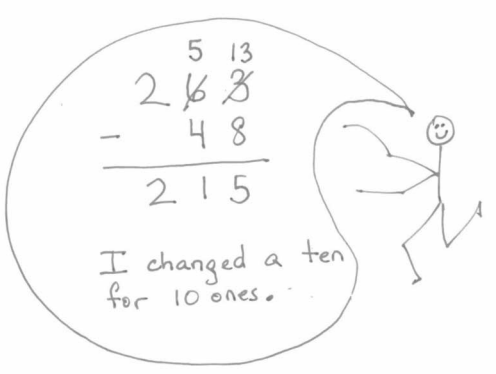
10 – 8 = 2
53 + 2 = 55

Decompose and Subtract From Ten

These strategies deepen place value understandings in preparation for Module 3 and the application of those understandings to addition and subtraction in Modules 4 and 5. Listen to how the language of *make ten* and *take from ten* is foundational to the work of later modules:

Module 3: *"I have 10 tens, so I can make a hundred. It's just like I can make a ten when I have 10 ones."*

Module 5: *"When I solve 263 – 48, I take a ten from 6 tens to make 5 tens and 13 ones. Now, I am ready to subtract in the ones place" (pictured to the right).*

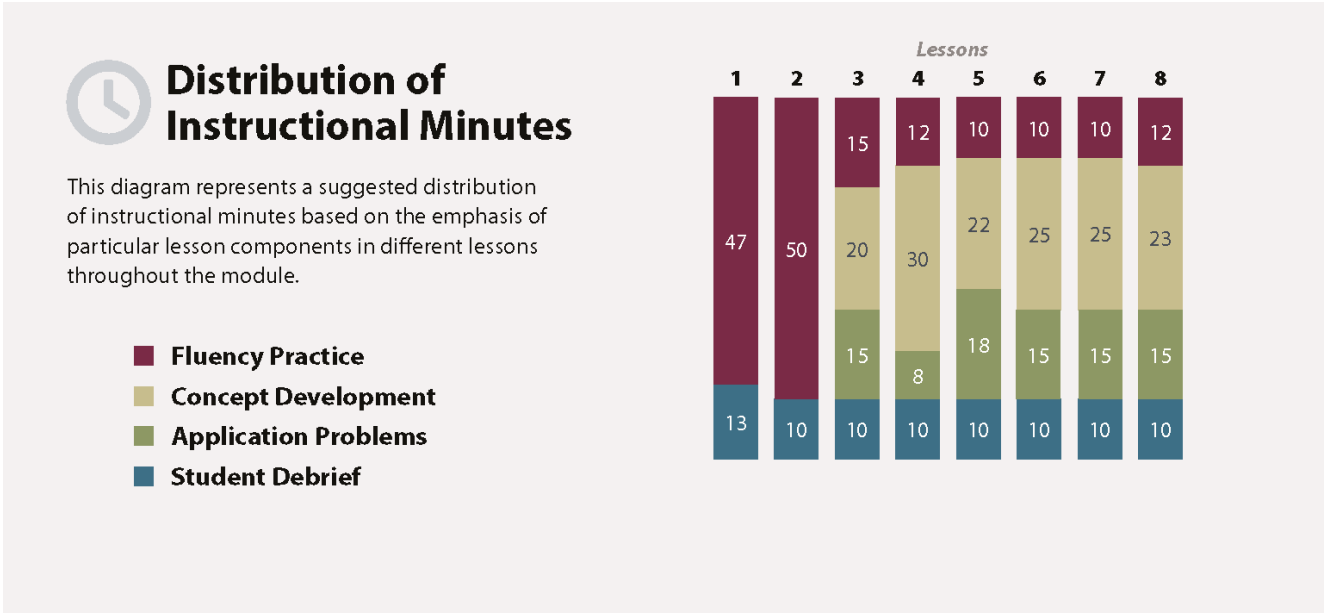


Note that mastery of sums and differences within 100 is not to be expected in Module 1 but rather by Module 8. Because the amount of practice required by each student to achieve mastery prior to Grade 3 will vary, a motivating, differentiated fluency program needs to be established in these first 2 weeks to set the tone for the year.

In Grade 2 Module 1, Application Problems begin in Topic B. They contextualize learning as students apply strategies to solving simple *add to, take from, put together/take apart* problem types using the Read-Draw-Write, or RDW, process. Application Problems may precede the Concept Development to act as the lead-in, allowing students to discover through problem-solving the logic and usefulness of a strategy before it is formally presented. Or, problems may follow the Concept Development so that students connect and apply new learning to real-world situations. At the beginning of Grade 2, problem-solving may begin more as a guided activity, with the goal being to move students to independent problem-solving, wherein they reason through the relationships embedded within the problem and choose an appropriate strategy to solve.

Notes on Pacing for Differentiation

It is not recommended to modify or omit any lessons in Module 1.



Focus Grade Level Standards

Represent and solve problems involving addition and subtraction.[1]

- Use addition and subtraction within 100 to solve one- and two-step word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.

Add and subtract within 20.[2]

- Fluently add and subtract within 20 using mental strategies. By end of Grade 2, know from memory all sums of two one-digit numbers.

[1]From this point forward, fluency practice with addition and subtraction to 20 is part of the students' ongoing experience.
[2]From this point forward, fluency practice with addition and subtraction to 20 is part of the students' ongoing experience.

Use place value understanding and properties of operations to add and subtract.

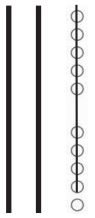
- Fluently add and subtract within 100 using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction.

Foundational Standards

- Decompose numbers less than or equal to 10 into pairs in more than one way, e.g., by using objects or drawings, and record each decomposition by a drawing or equation (e.g., 5 = 2 + 3 and 5 = 4 + 1).
- For any number from 1 to 9, find the number that makes 10 when added to the given number, e.g., by using objects or drawings, and record the answer with a drawing or equation.
- Compose and decompose numbers from 11 to 19 into ten ones and some further ones, e.g., by using objects or drawings, and record each composition or decomposition by a drawing or equation (e.g., 18 = 10 + 8); understand that these numbers are composed of ten ones and one, two, three, four, five, six, seven, eight, or nine ones.
- Relate counting to addition and subtraction (e.g., by counting on 2 to add 2).
- Add and subtract within 20, demonstrating fluency for addition and subtraction within 10. Use strategies such as counting on; making ten (e.g., 8 + 6 = 8 + 2 + 4 = 10 + 4 = 14); decomposing a number leading to a ten (e.g., 13 – 4 = 13 – 3 – 1 = 10 – 1 = 9); using the relationship between addition and subtraction (e.g., knowing that 8 + 4 = 12, one knows 12 – 8 = 4); and creating equivalent but easier or known sums (e.g., adding 6 + 7 by creating the known equivalent 6 + 6 + 1 = 12 + 1 = 13).
- Understand that the two digits of a two-digit number represent amounts of tens and ones. Understand the following as special cases:
  - 10 can be thought of as a bundle of ten ones—called a “ten.”
  - The numbers from 11 to 19 are composed of a ten and one, two, three, four, five, six, seven, eight, or nine ones.
- Add within 100, including adding a two-digit number and a one-digit number, and adding a two-digit number and a multiple of 10, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used. Understand that in adding two-digit numbers, one adds tens and tens, ones and ones; and sometimes it is necessary to compose a ten.
- Given a two-digit number, mentally find 10 more or 10 less than the number, without having to count; explain the reasoning used.
- Subtract multiples of 10 in the range 10–90 from multiples of 10 in the range 10–90 (positive or zero differences), using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.

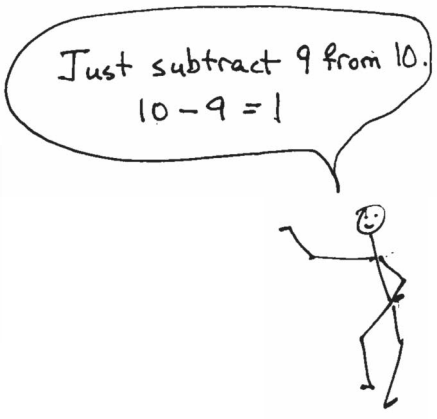
Focus Standards for Mathematical Practice

- **Reason abstractly and quantitatively.** Students reason abstractly when they decontextualize a word problem, representing a situation with a number sentence (e.g., *Mark had a stick of 9 green linking cubes. His friend gave him 4 yellow linking cubes. How many linking cubes does Mark have now?*). In their solutions, students write 9 + 4 = 13. In so doing, they have decontextualized the quantity from the situation. They then contextualize the solution when they write a statement of the answer (e.g., "Mark has 13 linking cubes now"). They reason that the *13* refers to the quantity, or number, of linking cubes.
- **Use appropriate tools strategically.** As students become more comfortable with tools and make ten/take from ten strategies, they begin to make smart decisions about when these tools might be useful to solve various problems.
- **Look for and make use of structure.** Students use the structure of the place value system to add and subtract like units within 100 (e.g., "I know 8 – 5 = 3, so 87 – 50 = 37 because 8 tens – 5 tens = 3 tens. I know 78 – 5, too, because 8 ones – 5 ones = 3 ones. I used the same easier problem, 8 – 5 = 3, just with ones instead of tens!").
- **Look for and express regularity in repeated reasoning.** In order to use the make ten and take from ten strategies efficiently, students practice completing a unit of ten during fluency in many ways (e.g., the teacher flashes a ten-frame and students identify the missing part). This skill is applied throughout the module. For example, students see the repeated reasoning of taking from ten in Lessons 6, 7, and 8 to subtract single-digit numbers. Whether solving 30 – 9, 13 – 9, or 31 – 9, they take out the ten, subtract 9 from 10, and put together the parts that are left (see image below).



30 – 9 = 21
/ \
20 10

10 – 9 = 1
20 + 1= 21



Overview of Module Topics and Lesson Objectives

	Topics and Objectives	Days
A	**Foundations for Fluency with Sums and Differences Within 100** Lesson 1: Practice making ten and adding to ten. Lesson 2: Practice making the next ten and adding to a multiple of ten.	2
B	**Initiating Fluency with Addition and Subtraction Within 100** Lesson 3: Add and subtract like units. Lesson 4: Make a ten to add within 20. Lesson 5: Make a ten to add within 100. Lesson 6: Subtract single-digit numbers from multiples of 10 within 100. Lesson 7: Take from ten within 20. Lesson 8: Take from ten within 100.	6
	End-of-Module Assessment: Topics A–B (assessment 1 day, return ½ day, remediation or further applications ½ day)	2
Total Number of Instructional Days		**10**

Terminology

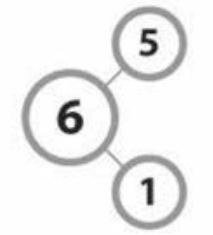
New or Recently Introduced Terms

- Make a ten (compose a unit of ten, e.g., 49 + 3 = 40 + 10 + 2)

Familiar Terms and Symbols[3]

- Addend (one of the numbers being added)
- A ten (a place value unit composed of 10 ones)
- Count on (count up from one addend to the total)
- Expression (e.g., 2 + 1, 13 – 6)
- Like units (e.g., frogs and frogs, ones and ones, tens and tens)
- Make ten and take from ten (e.g., 8 + 3 = 8 + 2 + 1 and 15 – 7 = 10 – 7 + 5 = 3 + 5)
- Number sentence (e.g., 2 + 3 = 5, 7 = 9 – 2, 10 + 2 = 9 + 3)
- Number bond (see image to the right)
- One (a place value unit, 10 of which may be composed to make a ten)
- Part (e.g., "What is the unknown part? 3 + ___ = 8")
- Partners to 10 (e.g., 10 and 0, 9 and 1, 8 and 2, 7 and 3, 6 and 4, 5 and 5)
- Say Ten counting (see the chart to the right)
- Ten plus facts (e.g., 10 + 3 = 13, 10 + 5 = 15, 10 + 8 = 18)
- Total (e.g., for 3 + 4 = 7 or 7 – 4 = 3, seven is the whole, or total)

Number Bond

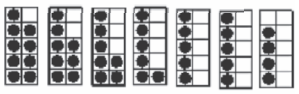


Regular	Say Ten
fifty-one	5 tens 1
sixty-seven	6 tens 7
seventy-five	7 tens 5
eighty-four	8 tens 4
ninety-five	9 tens 5

Suggested Tools and Representations

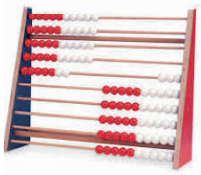
- 100-bead Rekenrek
- 5-group column
- Dice
- Hide Zero cards (Lesson 2 Template 1)
- Linking cubes
- Number bond
- Personal white boards
- Place value chart
- Quick ten (vertical line representing a unit of ten)
- Ten-frame cards (Lesson 1 Fluency Template 1)

Ten-Frame Cards

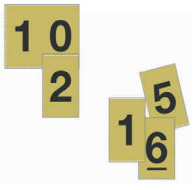


5-Group Column

Rekenrek



Hide Zero Cards



Quick Ten and Ones

[3]These are terms and symbols students have seen previously.

Suggested Methods of Instructional Delivery

Directions for Administration of Sprints

Sprints are designed to develop fluency. They should be fun, adrenaline-rich activities that intentionally build energy and excitement. A fast pace is essential. During Sprint administration, teachers assume the role of athletic coaches. A rousing routine fuels students' motivation to do their personal best. Student recognition of increasing success is critical, and so every improvement is celebrated.

One Sprint has two parts with closely related problems on each. Students complete the two parts of the Sprint in quick succession with the goal of improving on the second part, even if only by one more.

With practice the following routine takes about 8 minutes.

Sprint A

Pass Sprint A out quickly, face down on student desks with instructions to not look at the problems until the signal is given. (Some Sprints include words. If necessary, prior to starting the Sprint, quickly review the words so that reading difficulty does not slow students down.)

T: You will have 60 seconds to do as many problems as you can.

T: I do not expect you to finish all of them. Just do as many as you can, your personal best. (If some students are likely to finish before time is up, assign a number to *count by* on the back.)

T: Take your mark! Get set! THINK! (When you say *THINK*, students turn their papers over and work furiously to finish as many problems as they can in 60 seconds. Time precisely.)

T: Stop! Circle the last problem you did. I will read just the answers. If you got it right, call out "Yes!" If you made a mistake, circle it. Ready?

T: (Energetically, rapid-fire call the first answer.)

S: Yes!

T: (Energetically, rapid-fire call the second answer.)

S: Yes!

Repeat to the end of Sprint A or until no one has any more correct. If need be, read the *count-by* answers in the same way the Sprint answers were read. Each number *counted by* on the back is considered a correct answer.

T: Fantastic! Now, write the number you got correct at the top of your page. This is your personal goal for Sprint B.

T: How many of you got 1 right? (All hands should go up.)

T: Keep your hand up until I say the number that is 1 more than the number you got right. So, if you got 14 correct, when I say 15 your hand goes down. Ready?

T: (Quickly.) How many got 2 correct? 3? 4? 5? (Continue until all hands are down.)

Optional routine, depending on whether or not the class needs more practice with Sprint A:

T: I'll give you one minute to do more problems on this half of the Sprint. If you finish, stand behind your chair. (As students work, the person who scored highest on Sprint A could pass out Sprint B.)

T: Stop! I will read just the answers. If you got it right, call out "Yes!" If you made a mistake, circle it. Ready? (Read the answers to the first half again as students stand.)

Movement

To keep the energy and fun going, always do a stretch or a movement game in between Sprints A and B. For example, the class might do jumping jacks while skip counting by 5 for about 1 minute. Feeling invigorated, students take their seats for Sprint B, ready to make every effort to complete more problems this time.

Sprint B

Pass Sprint B out quickly, face down on student desks with instructions not to look at the problems until the signal is given. (Repeat the procedure for Sprint A up through the show of hands for how many are right.)

T: Stand up if you got more correct on the second Sprint than on the first.
S: (Stand.)
T: Keep standing until I say the number that tells how many more you got right on Sprint B. So, if you got 3 more right on Sprint B than you did on Sprint A, when I say *3*, you sit down. Ready? (Call out numbers starting with 1. Students sit as the number by which they improved is called. Celebrate the students who improved most with a cheer.)
T: Well done! Now, take a moment to go back and correct your mistakes. Think about what patterns you noticed in today's Sprint.
T: How did the patterns help you get better at solving the problems?
T: Rally Robin your thinking with your partner for 1 minute. Go!

Rally Robin is a style of sharing in which partners trade information back and forth, one statement at a time per person, for about 1 minute. This is an especially valuable part of the routine for students who benefit from their friends' support to identify patterns and try new strategies.

Students may take Sprints home.

RDW or Read, Draw, Write (a Number Sentence and a Statement)

Mathematicians and teachers suggest a simple process applicable to all grades:

1. Read.
2. Draw and label.
3. Write a number sentence.
4. Write a word sentence (statement).

The more students participate in reasoning through problems with a systematic approach, the more they internalize those behaviors and thought processes.

- What do I see?
- Can I draw something?
- What conclusions can I make from my drawing?

Modeling with Interactive Questioning	Guided Practice	Independent Practice
The teacher models the whole process with interactive questioning, some choral response, and talk such as "What did Monique say, everyone?" After completing the problem, students might reflect with a partner on the steps they used to solve the problem. "Students, think back on what we did to solve this problem. What did we do first?" Students might then be given the same or a similar problem to solve for homework.	Each student has a copy of the question. Though guided by the teacher, they work independently at times and then come together again. Timing is important. Students might hear, "You have 2 minutes to do your drawing." Or, "Put your pencils down. Time to work together again." The Debrief might include selecting different student work to share.	The students are given a problem to solve and possibly a designated amount of time to solve it. The teacher circulates, supports, and thinks about which student work to show to support the mathematical objectives of the lesson. When sharing student work, students are encouraged to think about the work with questions such as, "What do you notice about Jeremy's work?" "What is the same about Jeremy's work and Sara's work?"

Personal White Boards

Materials Needed for Personal White Boards

1 heavy duty, clear sheet protector
1 piece of stiff red tag board 11" × 8 ¼"
1 piece of stiff white tag board 11" × 8 ¼"
1 3"× 3" piece of dark synthetic cloth for an eraser (e.g., felt)
1 low odor dry erase marker: fine point

Directions for Creating Personal White Boards

Cut the white and red tag to specifications. Slide into the sheet protector. Store the eraser on the red side. Store markers in a separate container to avoid stretching the sheet protector.

Frequently Asked Questions About Personal White Boards

Why is one side red and one white?

- The white side of the board is the "*paper*." Students generally write on it and if working individually, then turn the board over to signal to the teacher that they have completed their work. The teacher then says, "Show me your boards," when most of the class is ready.

What are some of the benefits of a personal white board?

- The teacher can respond quickly to gaps in student understandings and skills. "Let's do some of these on our personal boards until we have more mastery."
- Student can erase quickly so that they do not have to suffer the evidence of their mistake.

- They are motivating. Students love both the drill and thrill capability and the chance to do story problems with an engaging medium.
- Checking work gives the teacher instant feedback about student understanding.

What is the benefit of this personal white board over a commercially purchased dry erase board?

- It is much less expensive.
- Templates such as place value charts, number bond mats, hundreds boards, and number lines can be stored between the two pieces of tag for easy access and reuse.
- Worksheets, story problems, and other problem sets can be done without marking the paper so that students can work on the problems independently at another time.
- Strips with story problems, number lines, and arrays can be inserted and still have a full piece of paper on which to write.
- The red versus white side distinction clarifies expectations. When working collaboratively, there is no need to use the red side. When working independently, students know how to keep their work private.
- The sheet protector can be removed if necessary to project the work.

Scaffolds[4]

The scaffolds integrated into *A Story of Units* give alternatives for how students access information as well as express and demonstrate their learning. Strategically placed margin notes are provided within each lesson elaborating on the use of specific scaffolds at applicable times. They address many needs presented by English language learners, students with disabilities, students performing above grade level, and students performing below grade level. Many of the suggestions are organized by Universal Design for Learning (UDL) principles and are applicable to more than one population. To read more about the approach to differentiated instruction in *A Story of Units,* please refer to "How to Implement *A Story of Units*."

[4]Students with disabilities may require Braille, large print, audio, or special digital files. Please visit greatminds.org/contact to request information on how to obtain student materials that satisfy the National Instructional Materials Accessibility Standard (NIMAS) format.

Preparing to Teach a Module

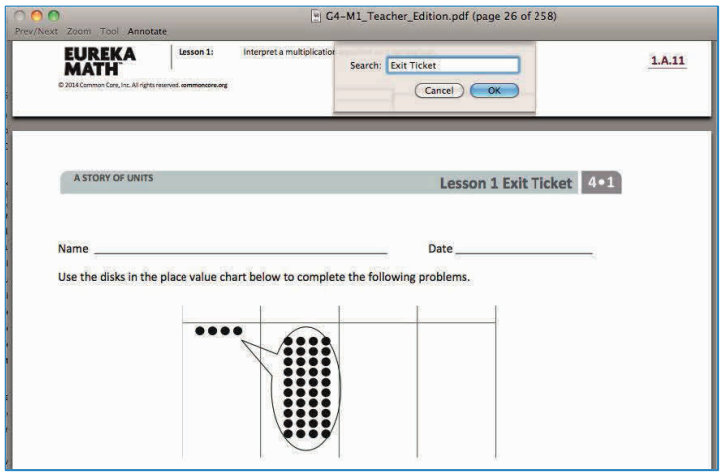
Preparation of lessons will be more effective and efficient if there has been an adequate analysis of the module first. Each module in *A Story of Units* can be compared to a chapter in a book. How is the module moving the plot, the mathematics, forward? What new learning is taking place? How are the topics and objectives building on one another? The following is a suggested process for preparing to teach a module.

Step 1: Get a preview of the plot.

A: Read the Table of Contents. At a high level, what is the plot of the module? How does the story develop across the topics?

B: Preview the module's Exit Tickets[5] to see the trajectory of the module's mathematics and the nature of the work students are expected to be able to do.

Note: When studying a PDF file, enter "Exit Ticket" into the search feature to navigate from one Exit Ticket to the next.



Step 2: Dig into the details.

A: Dig into a careful reading of the Module Overview. While reading the narrative, *liberally* reference the lessons and Topic Overviews to clarify the meaning of the text—the lessons demonstrate the strategies, show how to use the models, clarify vocabulary, and build understanding of concepts. Consider searching the video gallery on *Eureka Math*'s website to watch demonstrations of the use of models and other teaching techniques.

B: Having thoroughly investigated the Module Overview, read through the chart entitled Overview of Module Topics and Lesson Objectives to further discern the plot of the module. How do the topics flow and tell a coherent story? How do the objectives move from simple to complex?

Step 3: Summarize the story.

Complete the Mid- and End-of-Module Assessments. Use the strategies and models presented in the module to explain the thinking involved. Again, liberally reference the work done in the lessons to see how students who are learning with the curriculum might respond.

[5]A more in-depth preview can be done by searching the Problem Sets rather than the Exit Tickets. Furthermore, this same process can be used to preview the coherence or flow of any component of the curriculum, such as Fluency Practice or Application Problems.

Preparing to Teach a Lesson

A three-step process is suggested to prepare a lesson. It is understood that at times teachers may need to make adjustments (customizations) to lessons to fit the time constraints and unique needs of their students. The recommended planning process is outlined below. Note: The ladder of Step 2 is a metaphor for the teaching sequence. The sequence can be seen not only at the macro level in the role that this lesson plays in the overall story, but also at the lesson level, where each rung in the ladder represents the next step in understanding or the next skill needed to reach the objective. To reach the objective, or the top of the ladder, all students must be able to access the first rung and each successive rung.

Step 1: Discern the plot.

A: Briefly review the module's Table of Contents, recalling the overall story of the module and analyzing the role of this lesson in the module.

B: Read the Topic Overview related to the lesson, and then review the Problem Set and Exit Ticket of each lesson in the topic.

C: Review the assessment following the topic, keeping in mind that assessments can be found midway through the module and at the end of the module.

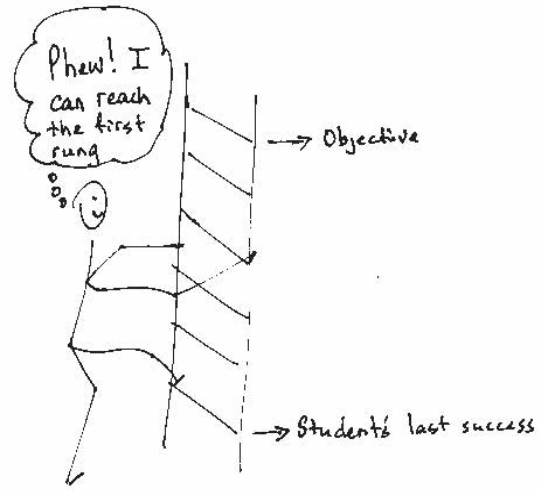
Step 2: Find the ladder.

A: Complete the lesson's Problem Set.

B: Analyze and write notes on the new complexities of each problem as well as the sequences and progressions throughout problems (e.g., pictorial to abstract, smaller to larger numbers, single- to multi-step problems). The new complexities are the rungs of the ladder.

C: Anticipate where students might struggle, and write a note about the potential cause of the struggle.

D: Answer the Student Debrief questions, always anticipating how students will respond.



Step 3: Hone the lesson.

At times, the lesson and Problem Set are appropriate for all students and the day's schedule. At others, they may need customizing. If the decision is to customize based on either the needs of students or scheduling constraints, a suggestion is to decide upon and designate "Must Do" and "Could Do" problems.

A: Select "Must Do" problems from the Problem Set that meet the objective and provide a coherent experience for students; reference the ladder. The expectation is that the majority of the class will complete the "Must Do" problems within the allocated time. While choosing the "Must Do" problems, keep in mind the need for a balance of calculations, various types of word problems, and work at both the pictorial and abstract levels.

B: "Must Do" problems might also include remedial work as necessary for the whole class, a small group, or individual students. Depending on anticipated difficulties, those problems might take different forms as shown in the chart below.

Anticipated Difficulty	"Must Do" Remedial Problem Suggestion
The first problem of the Problem Set is too challenging.	Write a short sequence of problems on the board that provides a ladder to Problem 1. Direct the class or small group to complete those first problems to empower them to begin the Problem Set. Consider labeling these problems "Zero Problems" since they are done prior to Problem 1.
There is too big of a jump in complexity between two problems.	Provide a problem or set of problems that creates a bridge between the two problems. Label them with the number of the problem they follow. For example, if the challenging jump is between Problems 2 and 3, consider labeling the bridging problems "Extra 2s."
Students lack fluency or foundational skills necessary for the lesson.	Before beginning the Problem Set, do a quick, engaging fluency exercise, such as a Rapid White Board Exchange, "Thrilling Drill," or Sprint. Before beginning any fluency activity for the first time, assess that students are poised for success with the easiest problem in the set.
More work is needed at the concrete or pictorial level.	Provide manipulatives or the opportunity to draw solution strategies. Especially in Kindergarten, at times the Problem Set or pencil and paper aspect might be completely excluded, allowing students to simply work with materials.
More work is needed at the abstract level.	Hone the Problem Set to reduce the amount of drawing as appropriate for certain students or the whole class.

C: "Could Do" problems are for students who work with greater fluency and understanding and can, therefore, complete more work within a given time frame. Adjust the Exit Ticket and Homework to reflect the "Must Do" problems or to address scheduling constraints.

D: At times, a particularly tricky problem might be designated as a "Challenge!" problem. This can be motivating, especially for advanced students. Consider creating the opportunity for students to share their "Challenge!" solutions with the class at a weekly session or on video.

E: Consider how to best use the vignettes of the Concept Development section of the lesson. Read through the vignettes, and highlight selected parts to be included in the delivery of instruction so that students can be independently successful on the assigned task.

F: Pay close attention to the questions chosen for the Student Debrief. Regularly ask students, "What was the lesson's learning goal today?" Help them articulate the goal.

Assessment Summary

Type	Administered	Format
End-of-Module Assessment Task	After Topic C	Constructed response with rubric

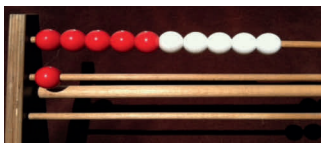
Topic A

Foundations for Fluency with Sums and Differences Within 100

Focus Standards:	■	Fluently add and subtract within 20 using mental strategies. By end of Grade 2, know from memory all sums of two one-digit numbers.	
Instructional Days:	2		
Coherence -Links from:	G1–M2	Introduction to Place Value Through Addition and Subtraction Within 20	
	G1–M4	Place Value, Comparison, Addition and Subtraction to 40	
	G1–M6	Place Value, Comparison, Addition and Subtraction to 100	
-Links to:	G2–M4	Addition and Subtraction Within 200 with Word Problems to 100	
	G3–M2	Place Value and Problem Solving with Units of Measure	

In this first topic of Grade 2, students set the stage for fluency with sums and differences within 100 by focusing on three essential skills:

1. Knowing the decompositions of any number within 10,
2. Knowing partners to 10,
3. Knowing teen numbers as 10 + *n*.



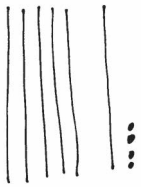
Ten

Topic A energetically revisits this familiar ground from Kindergarten and Grade 1 at a new pace.

In Lesson 1, targeted fluency work begins with ten-frame flashes where students review ways to make and take from ten (e.g., 9 + 1 = 10, 10 – 9 = 1). Students practice Say Ten counting on the Rekenrek (eleven or "ten 1," pictured to the right), and they become reacquainted with Sprints using a familiar 10 + *n* Sprint. Finally, students decompose ten in different ways by rolling a die and recording number bonds within 10 in "Target Practice."

Hide Zero

Lesson 2 follows a similar path as Lesson 1, with activities now extending to numbers within 100. Students review representations of two-digit numbers with quick tens and ones (see image to the right) in preparation for upcoming work within the module. Students build confidence and proficiency alternating between regular and Say Ten counting with the support of Hide Zero cards and a 100-bead Rekenrek, saying "6 tens 4" for 64. The final fluency in Lesson 2 focuses on making the next ten (e.g., 57 + 3 = 60), which is foundational to the mastery of sums and differences to 100.



64

The Application Problem and Concept Development are intentionally omitted from this topic to devote time to reviewing foundational fluencies for sums and differences within 100. All the exercises herein should be included in future fluency work as necessary so that students enter Grade 3 having memorized their single-digit addition facts and demonstrated fluency with sums and differences within 100.

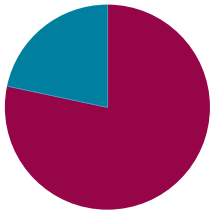
A Teaching Sequence Toward Mastery of Foundations for Fluency with Sums and Differences Within 100	
Objective 1:	**Practice making ten and adding to ten. (Lesson 1)**
Objective 2:	**Practice making the next ten and adding to a multiple of ten. (Lesson 2)**

Lesson 1

Objective: Practice making ten and adding to ten.

Suggested Lesson Structure

Fluency Practice	(47 minutes)
Student Debrief	(13 minutes)
Total Time	**(60 minutes)**



NOTES ON TOPIC A'S LESSON STRUCTURE:

Grade 2 students spend much of the year adding and subtracting. Topic A's lessons are a review of many of the fluency activities and experiences students know well from Grade 1. The purpose of the two days is to joyfully quicken the pace of Grade 1 work, establish new class routines, and remember foundational skills necessary for success with fluency with sums and differences within 100, a Grade 2 fluency goal. The Concept Development lessons begin in Topic B.

Fluency Practice (47 minutes)

- Ten-Frame Flash (5 minutes)
- Happy Counting the Say Ten Way (6 minutes)
- Sprint: Add a Ten and Some Ones (18 minutes)
- Target Practice: Within 10 (10 minutes)
- Pairs to Ten with Number Bonds (8 minutes)

Ten-Frame Flash (5 minutes)

Materials: (T) Ten-frame cards (Fluency Template 1), 5-group column cards (Fluency Template 2)

Note: By alternating between ten-frame and 5-groups column cards, students develop flexible perception of numbers 6–10 in two parts, with one part as 5. This activity practices the core fluency objective from Grade 1, adding and subtracting within 10.

The teacher flashes a ten-frame card for 2–3 seconds and guides students to respond on a signal. Students then generate a number sentence to get to 10.

T: (Flash the 9 ten-frame card. Give the signal.)
S: 9.
T: How much does 9 need to make 10?
S: 1.
T: Say the addition number sentence to make 10, starting with 9.
S: 9 + 1 = 10.
T: (Continue to show the 9 card.) Tell me a related subtraction sentence starting with 10.
S: 10 – 1 = 9. 10 – 9= 1.

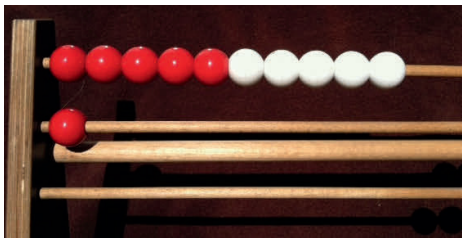
Continue the process, using both ten-frame cards and 5-group column cards in the following suggested sequence: 8, 2, 5, 7, 3, 6, 4, 10, and 0.

Happy Counting the Say Ten Way (6 minutes)

Materials: (T) 100-bead Rekenrek (or Slavonic Abacus)

Note: East Asian or Say Ten counting (e.g., 13 is said *ten 3*) matches the base ten structure of numbers. In contrast, the English language says the ten *after* the ones (e.g., *four-teen*). This makes *fourteen* easily confused with *forty*. Since Kindergarten, in *A Story of Units,* students have been counting the Say Ten way.

Part 1: Happy Counting on the Rekenrek

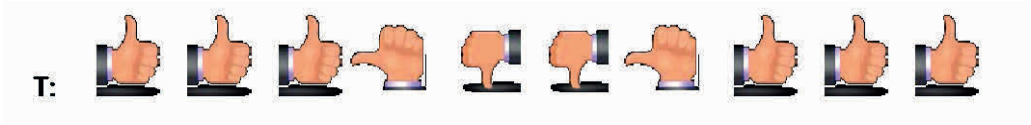


Ten 1

T: Let's count the Say Ten way.
T: (Show 10 beads. Move one at a time as students count.)
T: Ten 1. Say it with me. (See image to the right.)
S: Ten 1.
T: (Move the beads and have students count ten 2, ten 3, ten 4, ten 5, ten 6, ten 7, ten 8, ten 9, 2 tens.)
T: (Take one bead away.) Tell me the number the Say Ten way.
S: Ten 9.

Continue to count up and down within 20 as students call out the number the Say Ten way. As students demonstrate proficiency, consider alternating between the Say Ten way and the regular way (e.g., eleven, twelve, thirteen, fourteen, fifteen, sixteen, change to Say Ten counting and go down, ten 5, ten 4).

Part 2: Happy Counting



Ten 3 ten 4 ten 5 ten 6 pause ten 5 ten 4 pause ten 5 ten 6 ten 7 etc.

When Happy Counting, make the motions emphatic so counting is sharp and crisp. As students improve, up the challenge by increasing the speed and the number of direction changes or by using higher numbers. Be careful not to mouth the numbers!

T: Now, let's do some Happy Counting without the beads. Watch my thumb to know whether to count up or down. A thumb in the middle means pause. (Show signals as you explain.)
T: Let's count by ones starting at ten 3. Ready? (Rhythmically point up or down depending on if you want students to count up or count down.)
S: Ten 3, ten 4, ten 5, ten 6, (pause) ten 5, ten 4, (pause) ten 5, ten 6, ten 7, ten 8, (pause) ten 7, (pause) ten 8, ten 9, 2 tens.

Part 3: Say Ten as Ten Plus Facts

To segue to the upcoming Sprint, students say addition sentences for teen numbers when one addend is 10. Alternate between the regular way and the Say Ten way.

T: If I say ten 2, you say 10 + 2 = 12.
T: What do you say if I say thirteen?
S: 10 + 3 = 13.
T: Yes! You guessed the pattern. Here's another. Ten 5.
S: 10 + 5 = 15.
T: Fourteen.
S: 10 + 4 = 14.

Use the following suggested sequence: ten 6, seventeen, eighteen, ten 5, eleven, ten 8, ten 1, etc.

Sprint: Add a Ten and Some Ones (18 minutes)

Materials: (S) Add Ten and Some Ones Sprint

Note: See the *Suggested Methods of Instructional Delivery* in the Module Overview for clear instructions on administering Sprints. This Sprint brings automaticity back with the *ten plus* sums, which are foundational for the make a ten strategy and expanded form.

NOTES ON MULTIPLE MEANS OF ACTION AND EXPRESSION:

For Sprints, a fast pace is essential to build energy and excitement. To support students who do not excel under pressure, give them the chance to practice the Sprint at home the night before it is administered.

To maintain a high level of energy and enthusiasm, always do a stretch or movement game in between Sprint A and Sprint B. For example, do jumping jacks while skip-counting by fives.

Target Practice: Within 10 (10 minutes)

Materials: (S) Per set of partners: personal white board, target practice (Fluency Template 3), 1 numeral die

Note: Decomposition of single-digit numbers and 10 is a foundational skill for fluency with sums and differences to 20.

Assign Partner A and Partner B. Students write the target number, 10, in the circle at the top right of the target practice template.

Directions:

- Partner A rolls the die.
- Partner A writes the number rolled in one part of the first number bond.
- Partner B makes a bull's eye by writing the missing part that is needed to make ten.

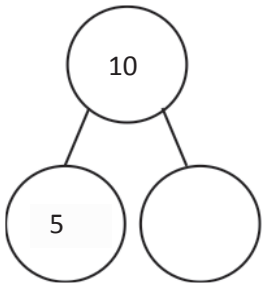
Adjust the target number as appropriate for each pair of students, focusing on totals of 6, 7, 8, 9, and 10.

NOTES ON MULTIPLE MEANS OF ACTION AND REPRESENTATION:

For students who have not yet mastered their pairs to ten, use fingers as models. Have students show the larger addend on their fingers and encourage them to look at their tucked fingers to determine the partner to make ten.

Pairs to Ten with Number Bonds (8 minutes)

Materials: (S) Personal white board



Note: This is a foundational skill for mastery of sums and differences to 20.

T: I'll show a number bond, and you tell me the missing part to make 10.
T: (Draw the bond shown to the right.)
S: 5.
T: (Erase the 5 and write 8.)
S: 2.

Continue with the following suggested sequence: 9, 7, 3, 6, 4, 1, 10, and 0.

T: With your partner, take turns saying pairs to make 10. Partner A, you will go first for now.

After about 30 seconds, have partners switch roles.

Student Debrief (13 minutes)

Lesson Objective: Practice making ten and adding to ten.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Guide students in a conversation to debrief today's lesson.

Any combination of the questions below may be used to lead the discussion.

- What math work did we do today that you remember from last year?
- What do you hope to get better at in math this year?
- Do you have a favorite math fact and why?
- Can you figure out the math goal of today's lesson? What name would you give this lesson?

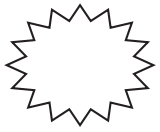
NOTES ON STUDENT DEBRIEF:

To close the majority of lessons, invite students to figure out the math goal. As the year progresses, they will come to anticipate this question, and responses will get increasingly mathematical, precise, and insightful. By engaging in the metacognitive exercise of articulating the goal, students take another step toward owning their learning. When possible, also ask students, "How would you teach this? Who would you teach it to?"

Exit Ticket (3 minutes)

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help with assessing students' understanding of the concepts that were presented in today's lesson and planning more effectively for future lessons. The questions may be read aloud to the students.

A

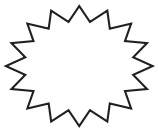
Number Correct: 

Name _____ Date _____

Add a Ten and Some Ones

1.	10 + 1 = _____	16.	3 + 10 = _____
2.	10 + 2 = _____	17.	4 + 10 = _____
3.	10 + 4 = _____	18.	1 + 10 = _____
4.	10 + 3 = _____	19.	2 + 10 = _____
5.	10 + 5 = _____	20.	5 + 10 = _____
6.	10 + 6 = _____	21.	_____ = 10 + 5
7.	_____ = 10 + 1	22.	_____ = 10 + 8
8.	_____ = 10 + 4	23.	_____ = 10 + 9
9.	_____ = 10 + 3	24.	_____ = 10 + 6
10.	_____ = 10 + 5	25.	_____ = 10 + 7
11.	_____ = 10 + 2	26.	16 = _____ + 6
12.	10 + 6 = _____	27.	8 + _____ = 18
13.	10 + 9 = _____	28.	_____ + 10 = 17
14.	10 + 7 = _____	29.	19 = _____ + 10
15.	10 + 8 = _____	30.	18 = 8 + _____

B

Improvement: _____ Number Correct: 

Name _____ Date _____

Add a Ten and Some Ones

1.	10 + 5 = _____	16.	4 + 10 = _____
2.	10 + 4 = _____	17.	3 + 10 = _____
3.	10 + 3 = _____	18.	2 + 10 = _____
4.	10 + 2 = _____	19.	1 + 10 = _____
5.	10 + 1 = _____	20.	3 + 10 = _____
6.	10 + 5 = _____	21.	_____ = 10 + 6
7.	_____ = 10 + 4	22.	_____ = 10 + 9
8.	_____ = 10 + 2	23.	_____ = 10 + 5
9.	_____ = 10 + 1	24.	_____ = 10 + 7
10.	_____ = 10 + 3	25.	_____ = 10 + 8
11.	_____ = 10 + 4	26.	17 = _____ + 7
12.	10 + 6 = _____	27.	3 + _____ = 13
13.	10 + 7 = _____	28.	_____ + 10 = 16
14.	10 + 9 = _____	29.	18 = _____ + 10
15.	10 + 8 = _____	30.	17 = 7 + _____

Name _____ Date _____

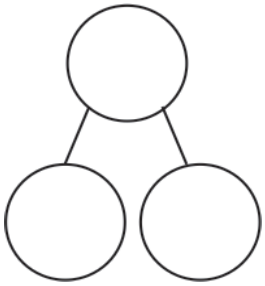
1. Add or subtract. Complete the number bond to match.

a. 9 + 1 = _____

1 + 9 = _____

10 – 1 = _____

10 – 9 = _____

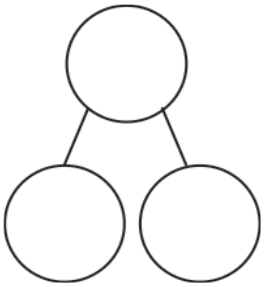


b. 4 + 6 = _____

6 + 4 = _____

10 – 6 = _____

10 – 4 = _____



2. Solve.

a. 10 + 5 = _____

b. 13 = 10 + _____

c. 10 + 8 = _____

Name _____ Date _____

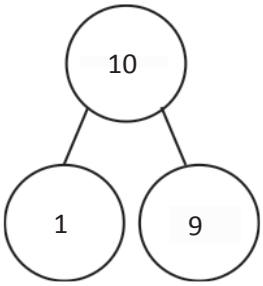
1. Add or subtract. Complete the number bond for each set.

9 + 1 = _____

1 + 9 = _____

10 – 1 = _____

10 – 9 = _____

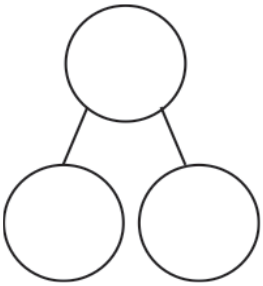


8 + 2 = _____

2 + 8 = _____

10 – 2 = _____

10 – 8 = _____



2. Solve. Draw a number bond for each set.

6 + 4 = _____

4 + 6 = _____

10 – 4 = _____

10 – 6 = _____

3 + 7 = _____

7 + 3 = _____

10 – 7 = _____

10 – 3 = _____

3. Solve.

10 = 7 + _____

10 = 3 + _____

10 = 5 + _____

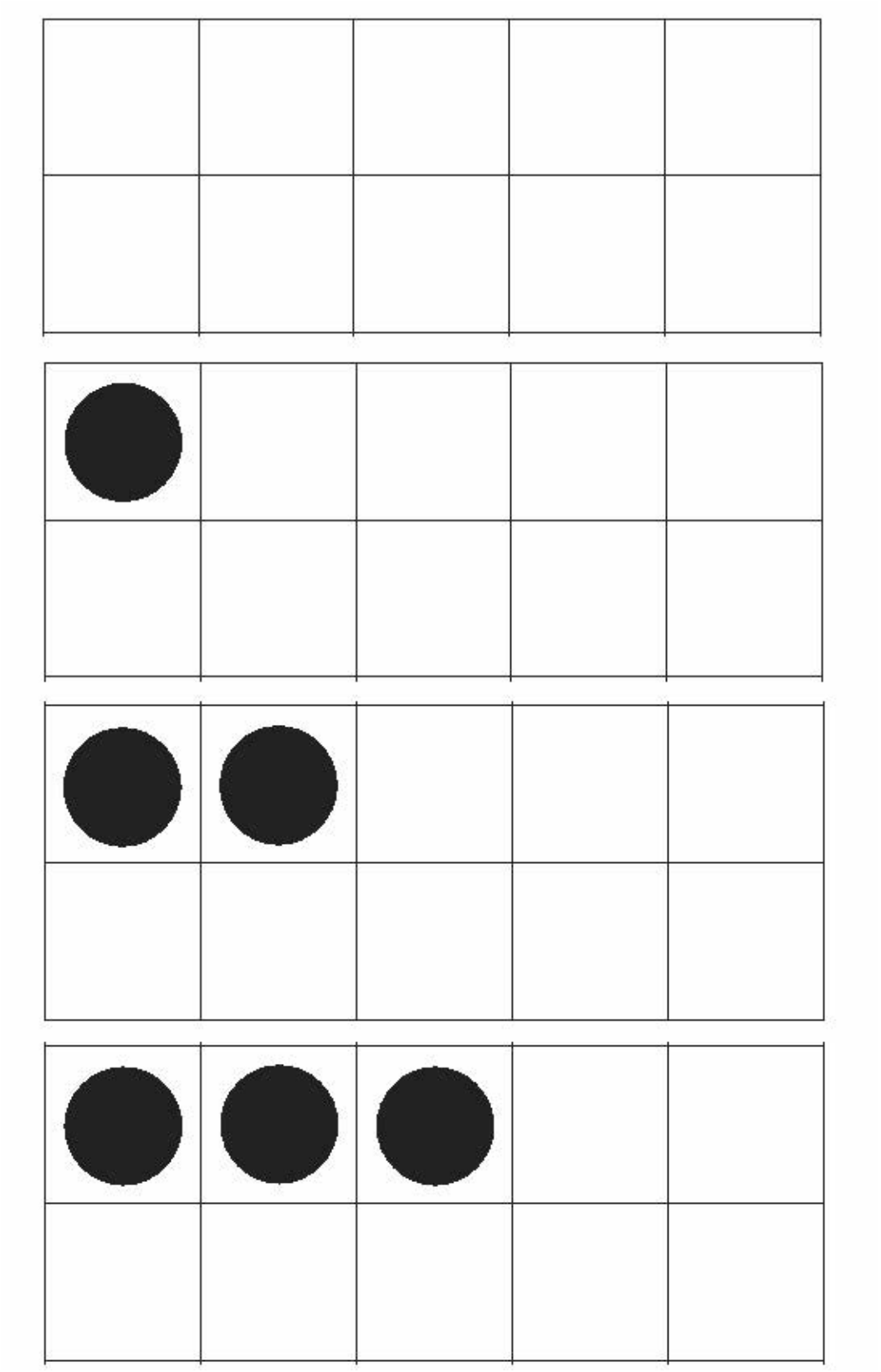
10 = 2 + _____

10 = _____ + 8

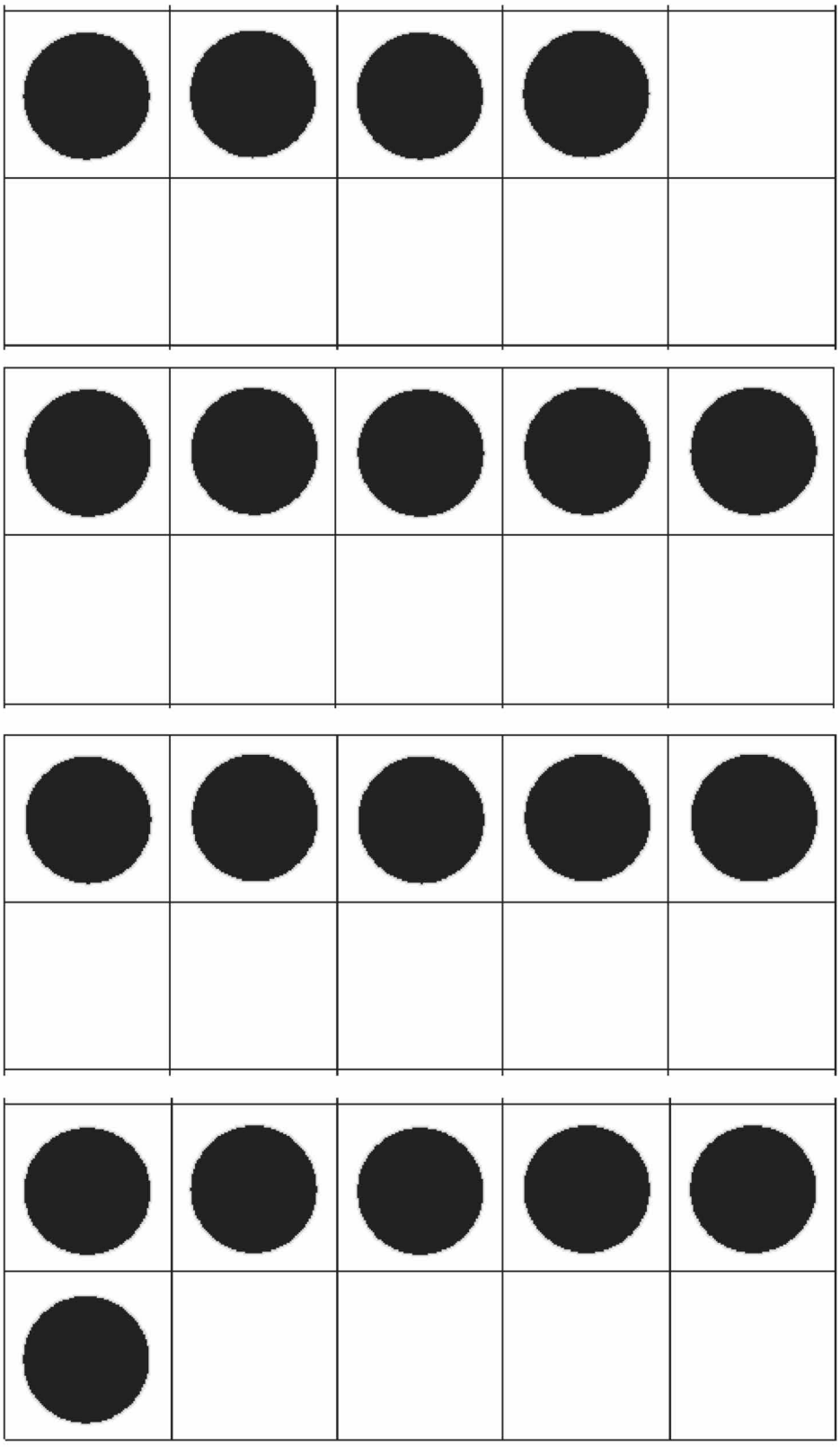
10 = _____ + 4

10 = _____ + 6

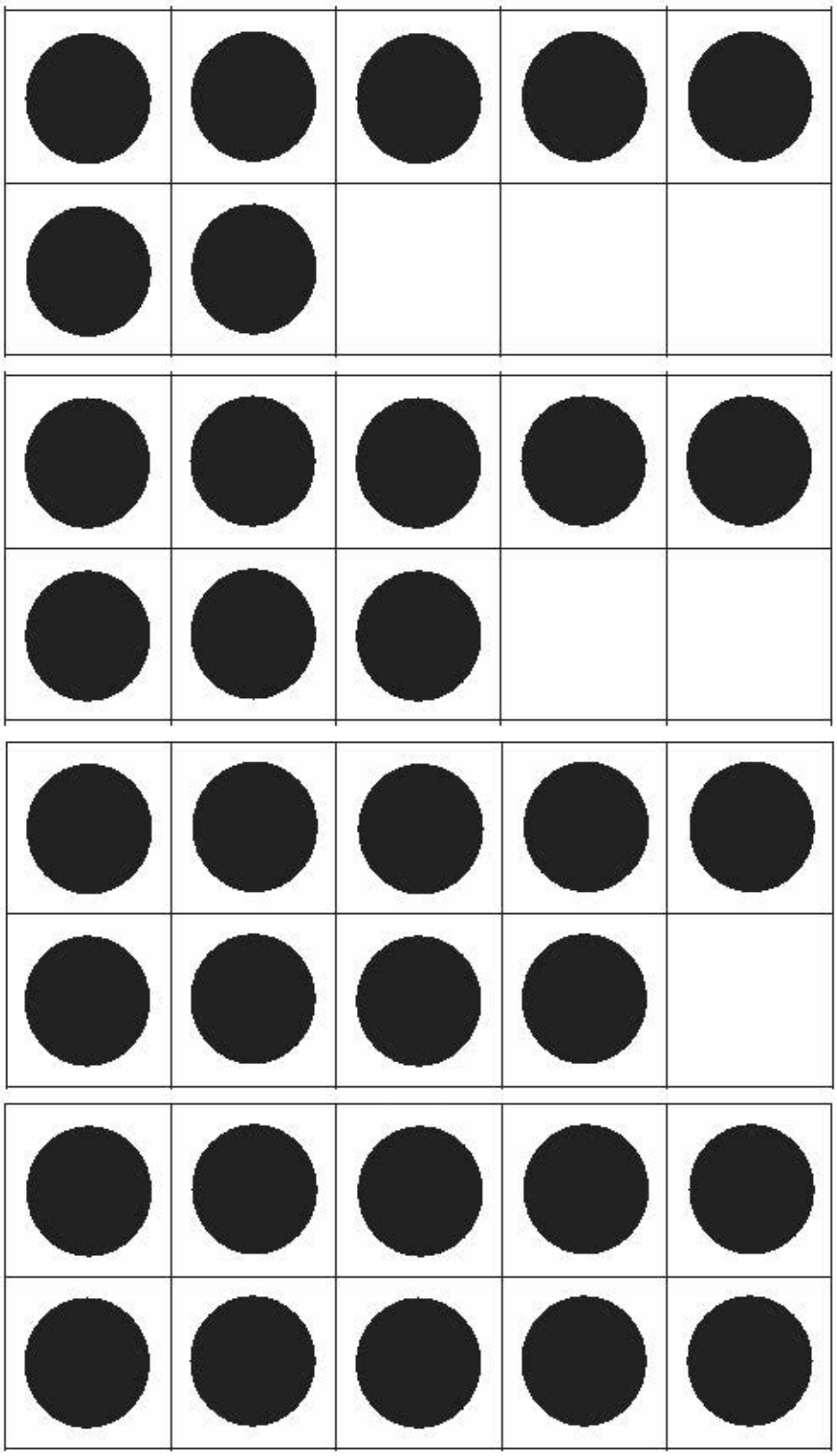
10 = _____ + 1



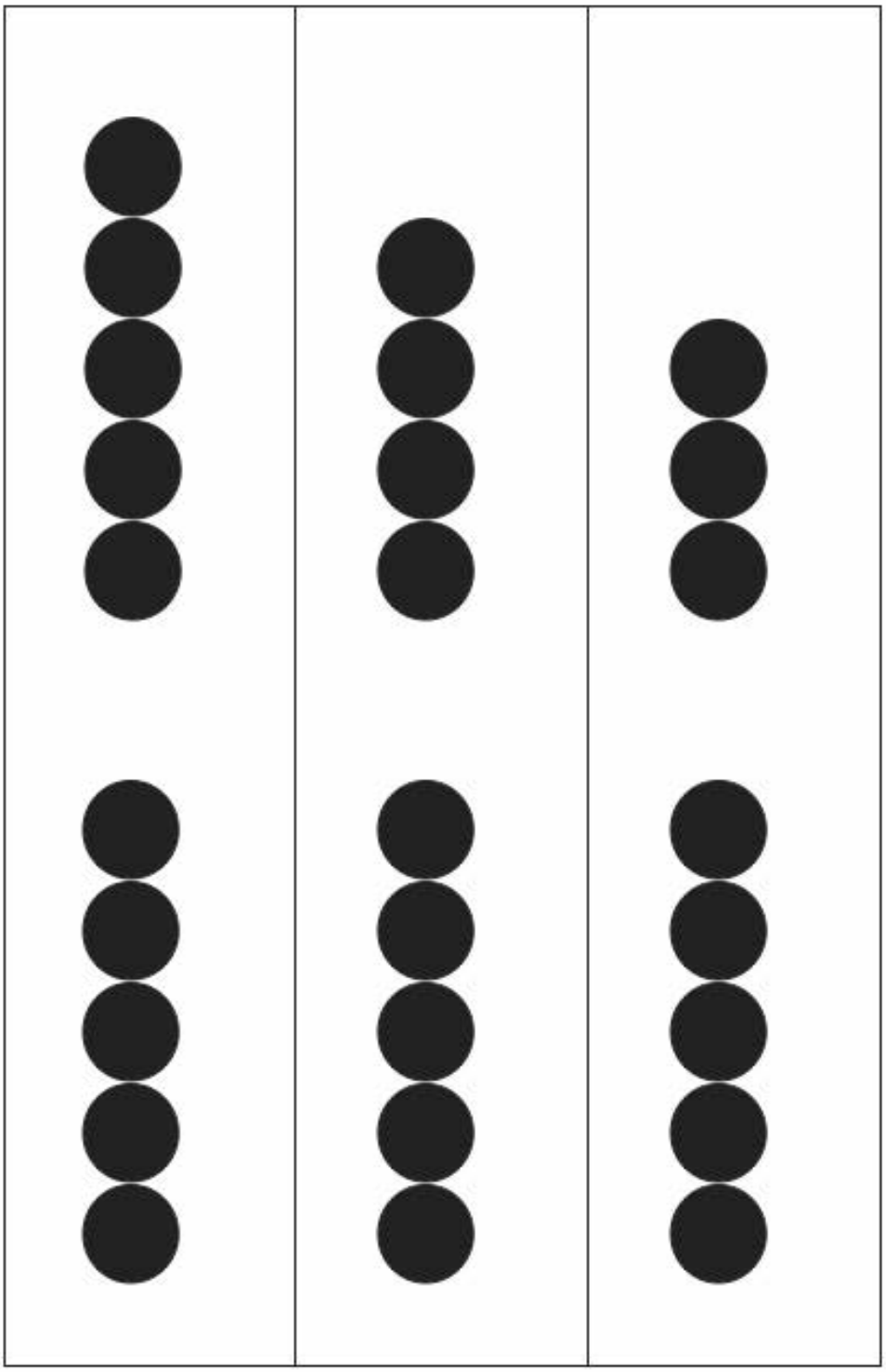
ten-frame cards



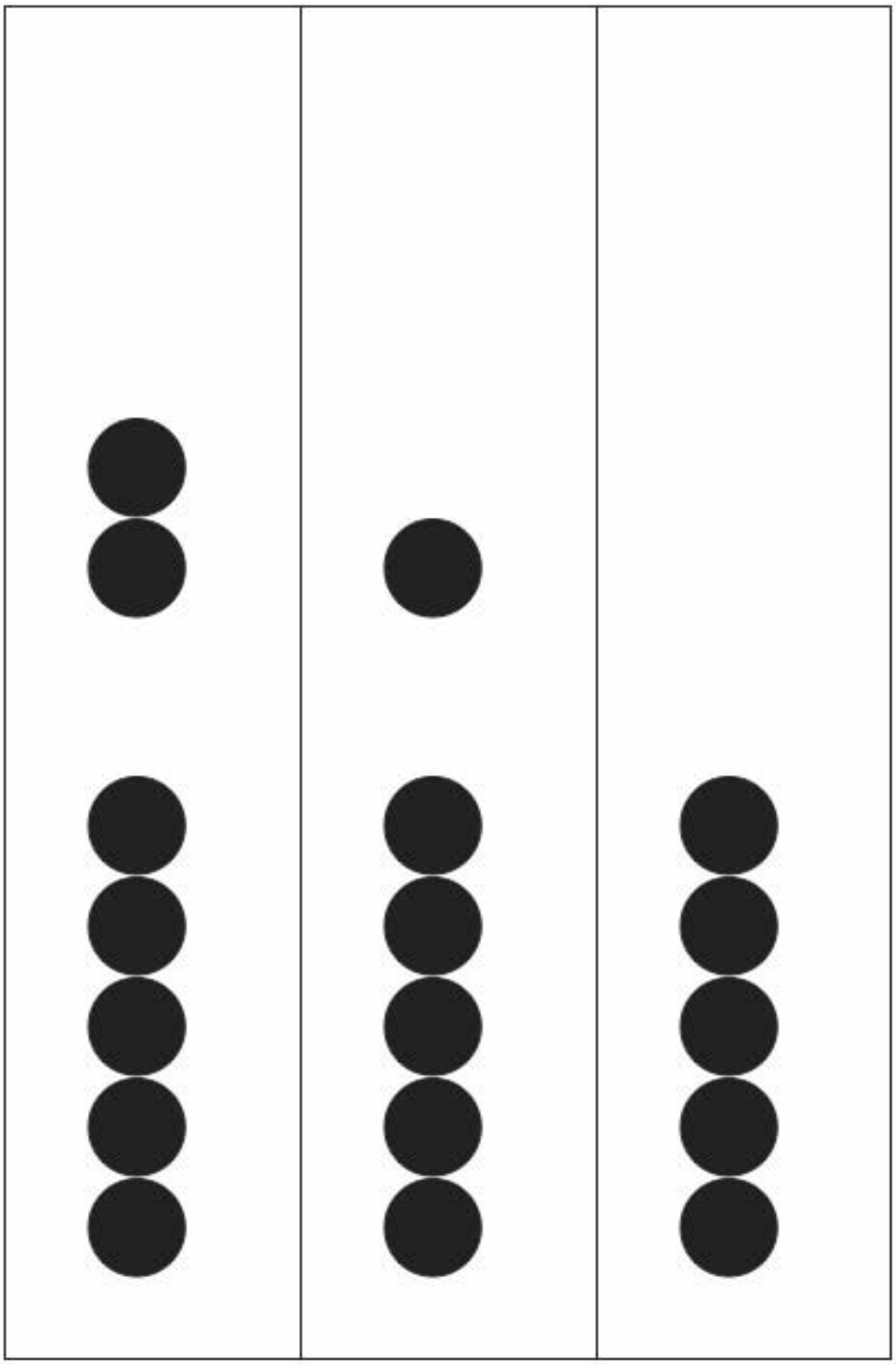
ten-frame cards



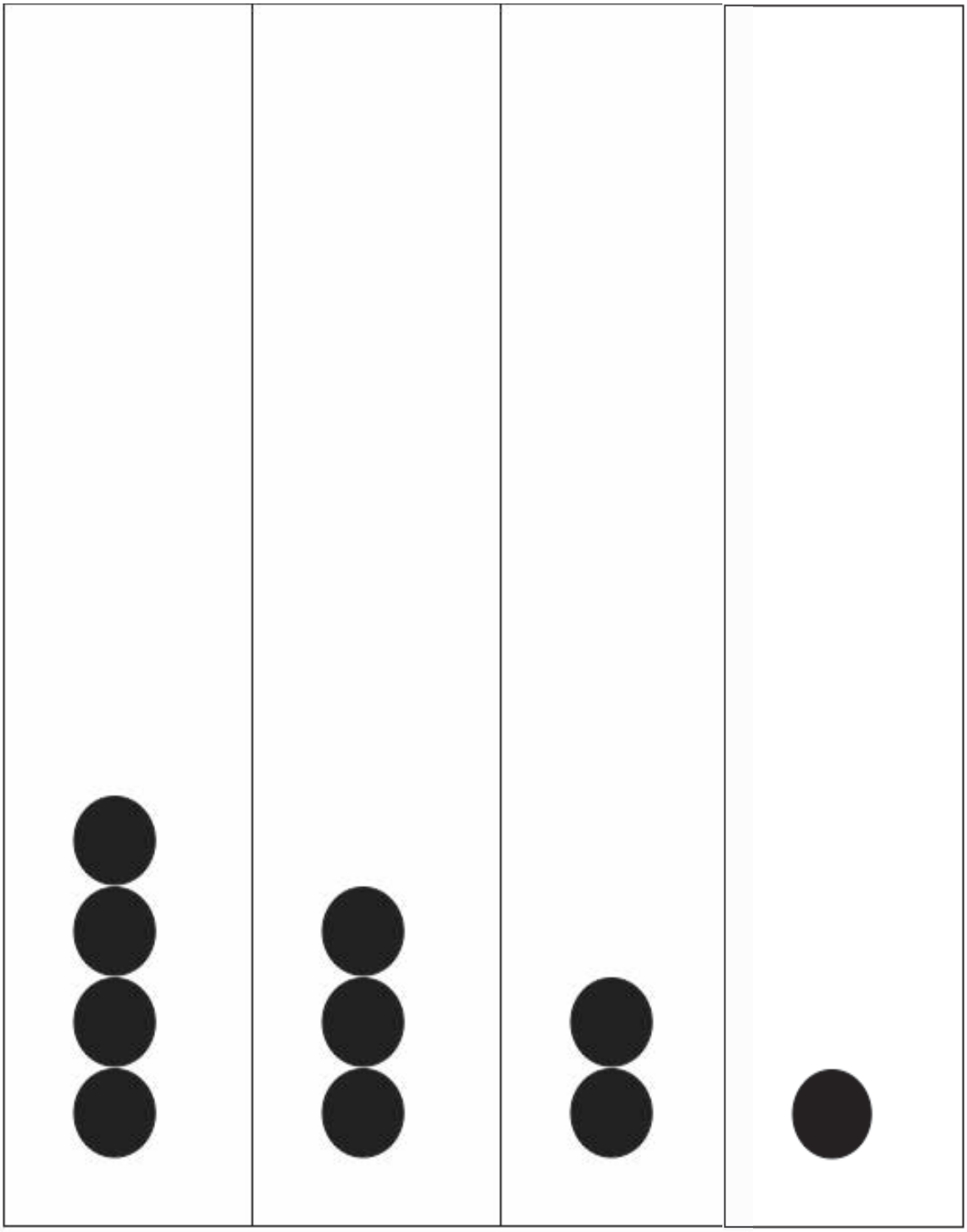
ten-frame cards



5-group column cards

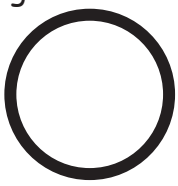


5-group column cards



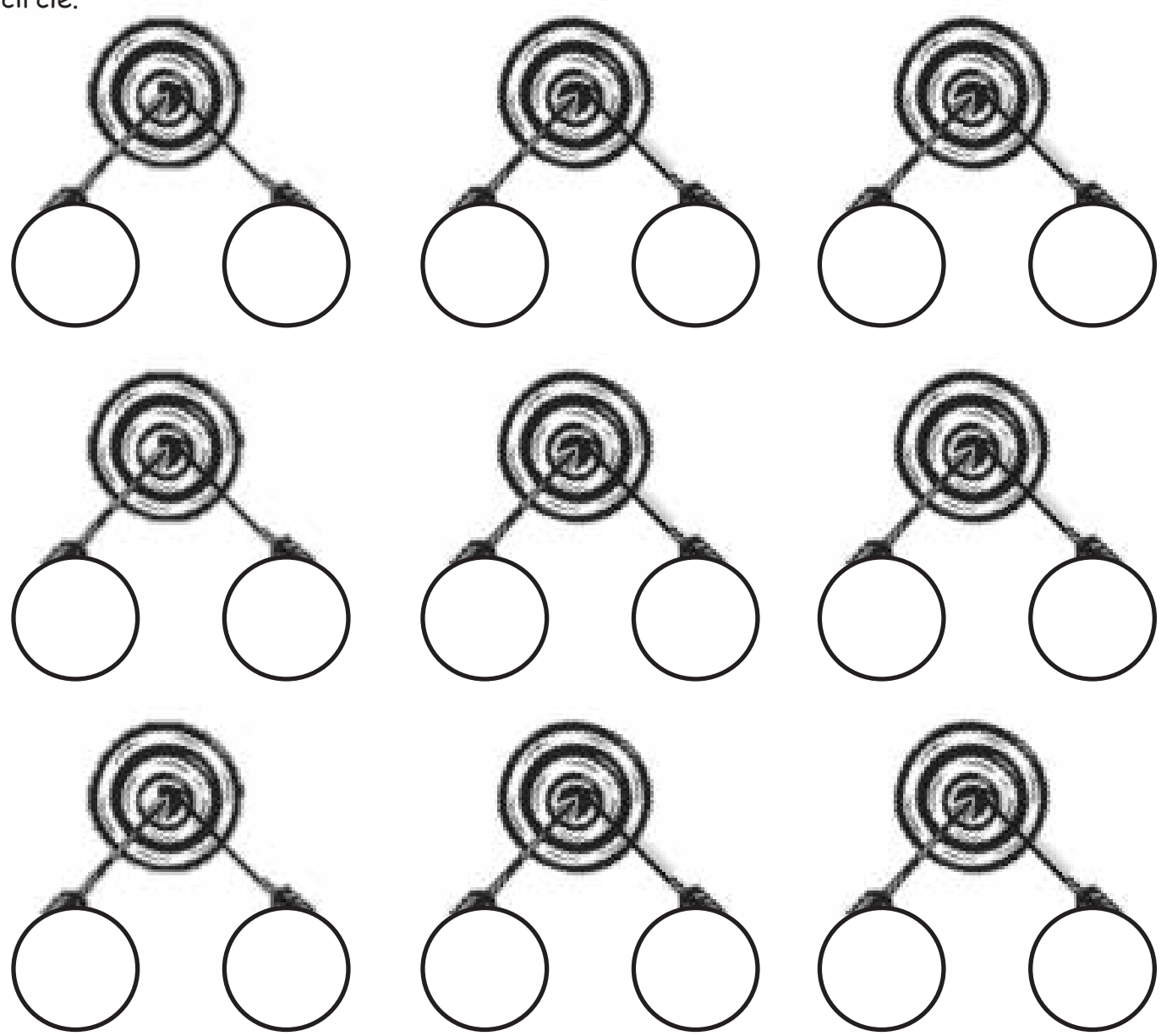
5-group column cards

Target Number:



Target Practice

Choose a *target number*, and write it in the middle of the circle on the top of the page. Roll a die. Write the number rolled in the circle at the end of one of the arrows. Then, make a bull's eye by writing the number needed to make your target in the other circle.



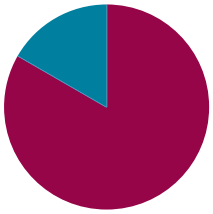
target practice

Lesson 2

Objective: Practice making the next ten and adding to a multiple of ten.

Suggested Lesson Structure

Fluency Practice	(50 minutes)
Student Debrief	(10 minutes)
Total Time	**(60 minutes)**



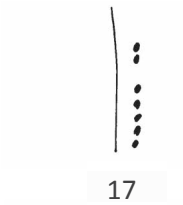
Fluency Practice (50 minutes)

- The Value of Tens and Ones (4 minutes)
- Happy Counting the Say Ten Way (10 minutes)
- Sprint: Add Tens and Ones (18 minutes)
- Target Practice: Within 10 (10 minutes)
- Make the Next Ten (8 minutes)

The Value of Tens and Ones (4 minutes)

Note: This activity reviews representing two-digit numbers with quick tens and ones in preparation for upcoming work within the module.

T: Tell me the total value of my tens and ones when I give the signal. (Draw 1 quick ten and 7 ones.)
S: 17.
T: The Say Ten way?
S: 1 ten 7.
T: Say the addition sentence to add the ten and ones.
S: 10 + 7 = 17.
T: (Draw 2 tens and 2 ones. Give the signal.) Tell me the total value.
S: 22.
T: The Say Ten way?
S: 2 tens 2.
T: Say the addition sentence starting with the larger number.
S: 20 + 2 = 22.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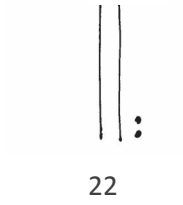
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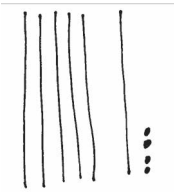

64

Continue the process using the following possible sequence: 29, 32, 38, 61, 64, 72, 81, 99, and 100.

Happy Counting the Say Ten Way (10 minutes)

Materials: (T) 100-bead Rekenrek, Hide Zero cards (Fluency Template)

Note: Repeating a similar fluency activity two days in a row gives students confidence and allows them to build proficiency.

Part 1: Say Ten Counting with the Rekenrek and Hide Zero Cards

T: (Show 11 with the Hide Zero cards. Pull them apart to show the 10 and the 1. Repeat silently with 15 and 19.)
T: (Show 12 with Hide Zero cards.) Say the number the regular way?
S: 12.
T: (Pull cards apart.) The Say Ten way?
S: Ten 2.
T: (Show 13.) The Say Ten way?
S: Ten 3.
T: The regular way?
S: 13.
T: Let's Say Ten count starting from 15 using the Rekenrek.

(To show 15, pull to the left a row of ten and a second row of five.)

T: Count the beads on the left the Say Ten way. (Show 15 beads.)
S: Ten 5, ten 6, ten 7, ten 8, ten 9.
T: 2 tens (show two rows of ten beads pulled to the left), and the pattern begins again.
S: 2 tens 1, 2 tens 2, 2 tens 3, 2 tens 4, 2 tens 5.
T: Let's start with a new number. (Move beads to show 47.)
T: How much do I have?
S: 47.
T: What is 47 the Say Ten way? (Pictured to the right.)
S: 4 tens 7.

For about 2 minutes, students count up and down within 100. Each 20 to 30 seconds, begin a new counting sequence starting from a larger decade. While moving up and down, cross over tens frequently (e.g., 38, 39, 40, 41, 40, 39 or 83, 82, 81, 80, 79, 78, 79, 80, 81) as this is more challenging, especially counting down.

Part 2: Happy Counting

T: Follow my hand as we Happy Count. Watch my thumb.
T: Let's start at 2 tens 8. (Stop before students start to lose enthusiasm, after about 1 minute.)
T: Excellent! Try it with your partner. Partner A, you are the teacher today. I'll give you 30 seconds.

To segue to the Sprint in the following activity, ask students to share the number sentences for the following numbers.

T: Let's share number sentences that break apart two-digit numbers into tens and ones. (Show 28 on the Rekenrek and with Hide Zero cards.) I say 2 tens 8, and you say 20 + 8 = 28. (Break apart Hide Zero cards to show 20 and 8.)
T: 2 tens 8.
S: 20 + 8 = 28.
T: (Write 20 + 8 = 28.)
T: 5 tens 3.
S: 50 + 3 = 53.
T: (Write 50 + 3 = 53.)

Use the following suggested sequence: 36, 19, 58, 77, 89, 90.

NOTES ON MULTIPLE MEANS OF ACTION AND EXPRESSION:

For students who are performing significantly below grade level and were unable to work past the first 10 questions in Lesson 1, perhaps let them do "Add a Ten and Some Ones" again today, this time with drawings or materials.

Sprint: Add Tens and Ones (18 minutes)

Materials: (S) Add Tens and Some Ones Sprint

Note: This Sprint brings automaticity back with the *tens plus* sums, which are foundational for adding within 100 and expanded form.

Target Practice: Within 10 (10 minutes)

Materials: (S) Per set of partners: personal white board, target practice (Lesson 1 Fluency Template 3), 1 numeral die

Note: Decomposition of single-digit numbers and 10 is a foundational skill for fluency with sums and differences to 20.

Assign Partner A and Partner B. Students write their choice of target number in the circle at the top right of the Target Practice template.

- Partner A rolls the die.
- Partner A writes the number rolled in the circle at the end of one of the arrows.
- Partner B makes a bull's eye by writing the number in the other circle that is needed to make the target.

NOTES ON MULTIPLE MEANS OF ENGAGEMENT:

For students who have mastered partners within 10, assign numbers within 20 as the target number.

Adjust the target number as appropriate for each pair of students, focusing on totals of 6, 7, 8, 9, and 10. If the pair demonstrates fluency, challenge them to move into teen numbers!

Make the Next Ten (8 minutes)

Note: This is a foundational skill for mastery of sums and differences to 20. If students do not know their partners to 10, do not advance to making multiples of ten.

T: I'll say a number, and you tell me what it needs to make the next 10.
T: 8. Get ready.
S: 2.
T: 28.
S: 2.
T: 58.
S: 2.

Continue the process using the following possible sequence: 7, 27, 67, 87.

T: With your partner, take turns saying pairs to make 10, 20, 30, 40, 50, 60, 70, 80, 90, or 100. It's your choice. Partner A, you will go first for now.

After about 30 seconds, have partners switch roles. Keep it fun and joyful!

Student Debrief (10 minutes)

Lesson Objective: Practice making the next ten and adding to a multiple of ten.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Guide students in a conversation to debrief today's lesson.

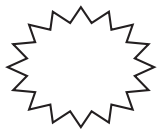
Any combination of the questions below may be used to lead the discussion.

- How does knowing 10 + 3 help us with 50 + 3?
- How does knowing that 8 needs 2 to make ten help us know how to get from 28 to the next ten?
- How are Hide Zero cards and the Rekenrek similar? How are they different?
- What learning today did you remember from last year?
- Can you figure out the math goal of today's lesson? What name would you give this lesson?

Exit Ticket (3 minutes)

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help with assessing students' understanding of the concepts that were presented in today's lesson and planning more effectively for future lessons. The questions may be read aloud to the students.

A

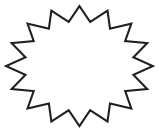
Number Correct: 

Name _____ Date _____

Add Tens and Ones

1.	10 + 3 =_____	16.	10 + _____ = 13
2.	20 + 2 =_____	17.	40 + _____ = 42
3.	30 + 4 =_____	18.	60 + _____ = 61
4.	50 + 3 =_____	19.	70 + _____ = 75
5.	20 + 5 =_____	20.	80 + _____ = 83
6.	50 + 5 =_____	21.	60 + 9 =_____
7.	_____ = 40 + 1	22.	80 + 9 =_____
8.	_____ = 20 + 4	23.	80 + ____ = 86
9.	_____ = 20 + 3	24.	90 + ____ = 97
10.	_____ = 30 + 5	25.	____ + 6 = 76
11.	_____ = 40 + 5	26.	____ + 6 = 86
12.	30 + 6 =_____	27.	86 = ____ + 6
13.	20 + 9 =_____	28.	____ + 60 = 67
14.	40 + 7 =_____	29.	95 = ____ + 90
15.	50 + 8 =_____	30.	97 = 7 + ____

B

Improvement: _____ Number Correct: 

Name _____ Date _____

Add Tens and Ones

1.	10 + 2 =_____	16.	10 + _____ = 12
2.	20 + 3 =_____	17.	40 + _____ = 42
3.	30 + 4 =_____	18.	60 + _____ = 61
4.	50 + 4 =_____	19.	70 + _____ = 75
5.	40 + 5 =_____	20.	80 + _____ = 83
6.	50 + 1 =_____	21.	70 + 8 =_____
7.	_____ = 50 + 1	22.	80 + 8 =_____
8.	_____ = 20 + 4	23.	70 + ____ = 76
9.	_____ = 20 + 2	24.	90 + ____ = 99
10.	_____ = 30 + 5	25.	____ + 8 = 78
11.	_____ = 40 + 3	26.	____ + 6 = 96
12.	30 + 7 =_____	27.	86 = ____ + 6
13.	20 + 8 =_____	28.	____ + 60 = 67
14.	40 + 9 =_____	29.	95 = ____ + 90
15.	50 + 6 =_____	30.	97 = 7 + ____

Name _____ Date _____

Solve.

1.

a. 10 + 3 = _____

b. 30 + 4 = _____

c. 60 + 5 = _____

d. 90 + 1 = _____

2.

a. _____ = 10 + 7

b. _____ = 20 + 9

c. _____ = 70 + 6

d. _____ = 90 + 8

Name _____ Date _____

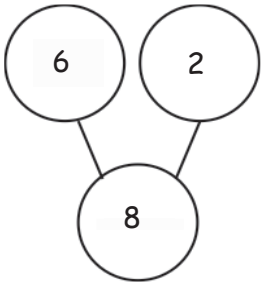
1. Add or subtract. Draw a number bond for (b).

a. 6 + 2 = _____

2 + 6 = _____

8 – 2 = _____

8 – 6 = _____



b. _____ = 3 + 5

_____ = 5 + 3

_____ = 8 – 3

_____ = 8 – 5

2. Solve.

20 + 4 = _____

40 + 3 = _____

70 + 2 = _____

80 + 5 = _____

_____ = 20 + 9

_____ = 40 + 8

_____ = 50 + 6

_____ = 90 + 7

3. Solve.

14 = 10 + _____

23 = 20 + _____

71 = 70 + _____

82 = 80 + _____

19 = _____ + 9

29 = _____ + 9

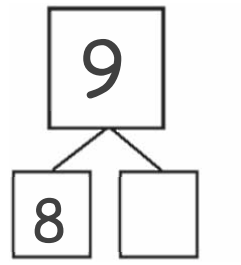
78 = _____ + 8

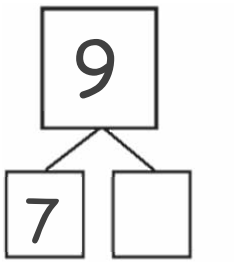
87 = _____ + 7

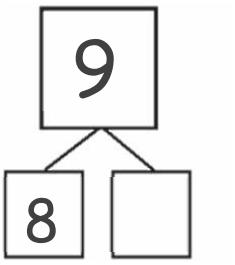
Name _____ Date _____

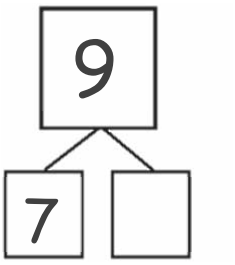
Number Bond Dash

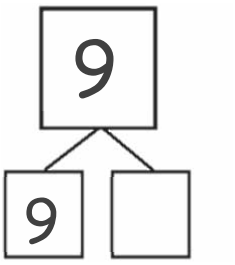
Do as many as you can in 90 seconds. Write the number of bonds you finished here:

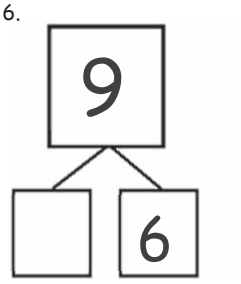
1. 

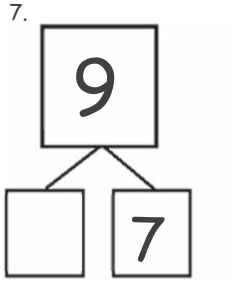
2. 

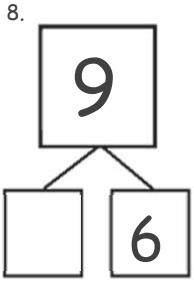
3. 

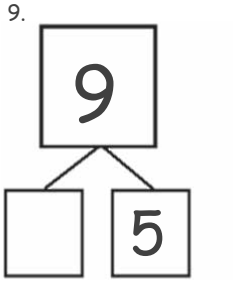
4. 

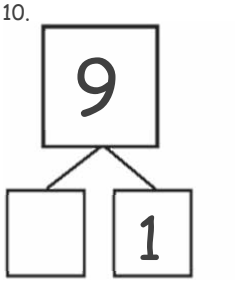
5. 

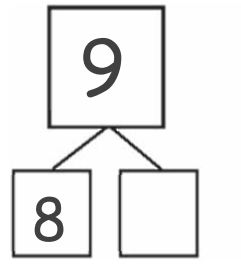
6. 

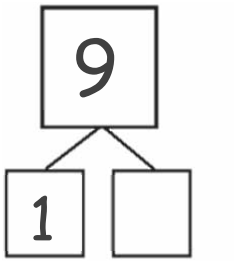
7. 

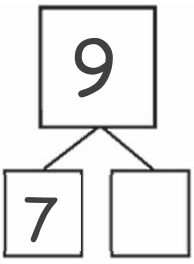
8. 

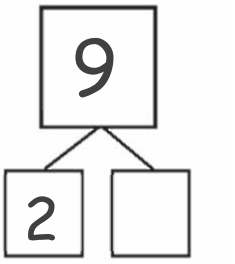
9. 

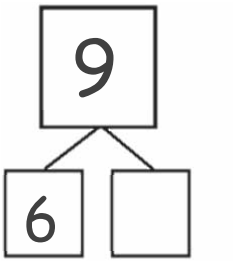
10. 

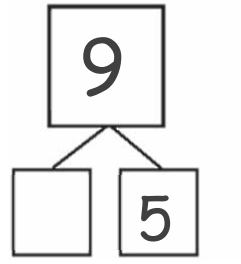
11. 

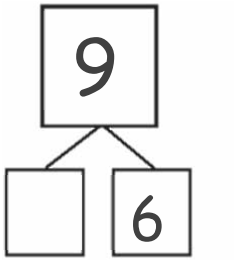
12. 

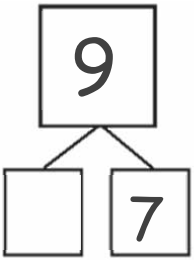
13. 

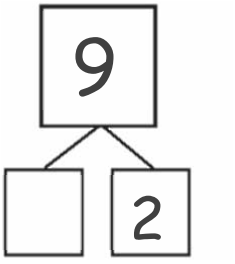
14. 

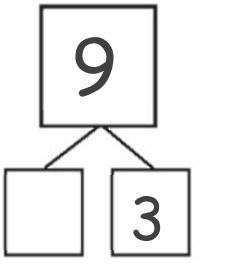
15. 

16. 

17. 

18. 

19. 

20. 

1	0	0	1	0	1
2	0	0	2	0	2
3	0	0	3	0	3
4	0	0	4	0	4
5	0	0	5	0	5
6	0	0	6	0	6

Hide Zero cards

7	0	0	7	0	7
8	0	0	8	0	8
9	0	0	9	0	9

Hide Zero cards

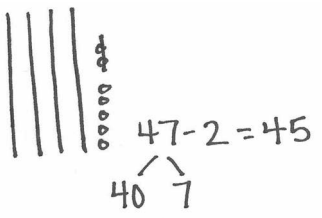
Topic B

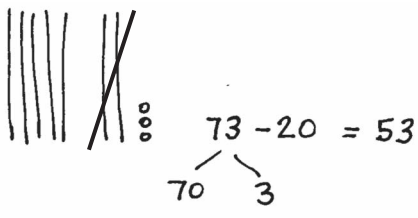
Initiating Fluency with Addition and Subtraction Within 100

Focus Standards:	■	Use addition and subtraction within 100 to solve one- and two-step word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.	
	■	Fluently add and subtract within 20 using mental strategies. By end of Grade 2, know from memory all sums of two one-digit numbers.	
	■	Fluently add and subtract within 100 using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction.	
Instructional Days:	6		
Coherence -Links from:	G1–M2	Introduction to Place Value Through Addition and Subtraction Within 20	
	G1–M4	Place Value, Comparison, Addition and Subtraction to 40	
	G1–M6	Place Value, Comparison, Addition and Subtraction to 100	
-Links to:	G2–M4	Addition and Subtraction Within 200 with Word Problems to 100	
	G3–M2	Place Value and Problem Solving with Units of Measure	

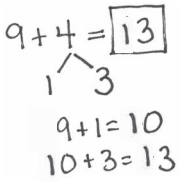
Now that students have sharpened their skills, they are ready to solve problems by decomposing and composing units. Lessons 3, 4, 5, and 7 revisit Grade 1 learning at a new pace and without a heavy reliance upon concrete and pictorial models while simultaneously preparing students for the new learning of Lessons 6 and 8, subtracting single-digit numbers from two-digit numbers within 100.

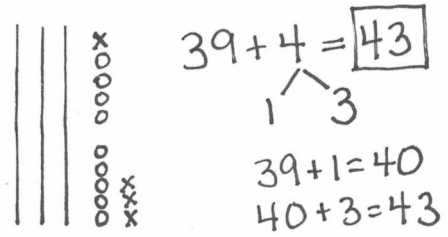
In Lesson 3, students use their understanding of place value to add and subtract like units, by decomposing addends into tens and ones. For example, students apply their knowledge that 7 – 2 = 5 to solve 47 – 2 (7 ones – 2 ones = 5 ones) and 73 – 20 (7 tens – 2 tens = 5 tens).



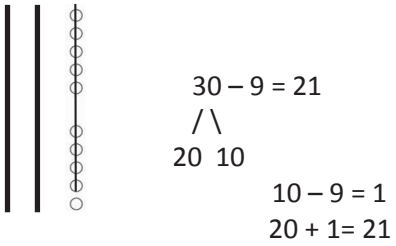


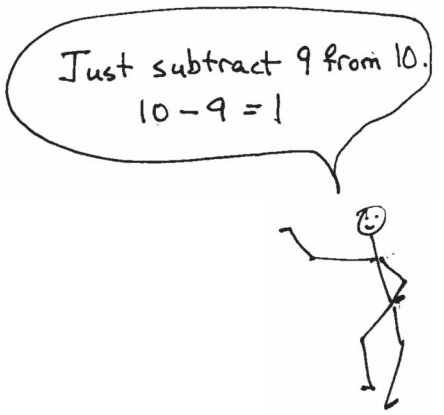
In Lesson 4, students use the Grade 1 make ten strategy. For example, to add 9 + 4 (pictured to the right), students decompose 4 as 1 and 3 in order to complete a unit of ten (9 + 1) and then add, or compose, the ten with the remaining ones (10 + 3). They then apply the same understanding to make the *next* ten (pictured below) in Lesson 5.



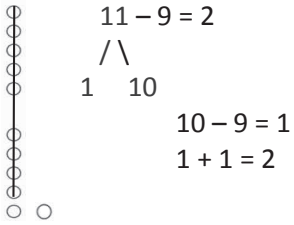


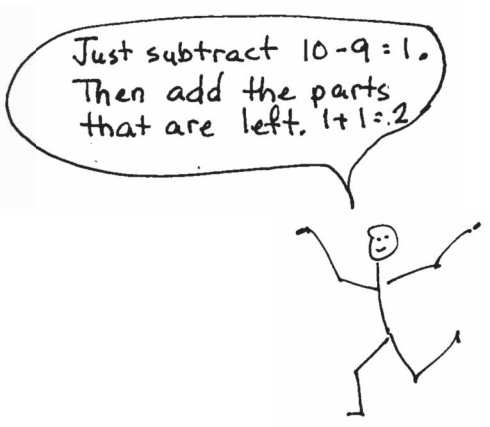
In Lesson 6, students advance their Grade 1 take from ten strategy to subtract single-digit numbers from multiples of 10. For example, 30 – 9 is solved by decomposing 30 as 20 and 10, taking from ten (10 – 9), and composing the parts that are left (20 + 1).



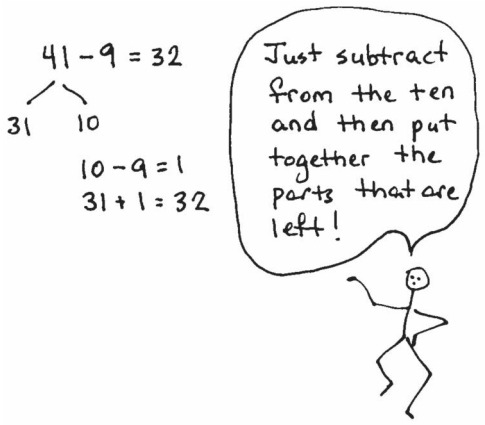


In Lesson 7, students practice the Grade 1 take from ten strategy within 20. Students repeat the same reasoning from Lesson 6. For example, 11 – 9 is solved by decomposing 11 as 1 and 10, taking from ten (10 – 9), and composing the parts that are left (1 + 1).





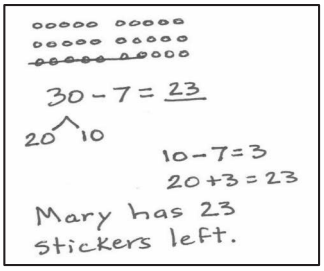
Topic B culminates with Lesson 8, where students, as in Lesson 6, extend the take from ten strategy to numbers within 100. For example, to solve 41 – 9, students decompose 41 as 31 and 10, take from ten (10 – 9), and add the parts that are left (31 + 1). Notice how the student talking to the right has now generalized the process from the specific problem.

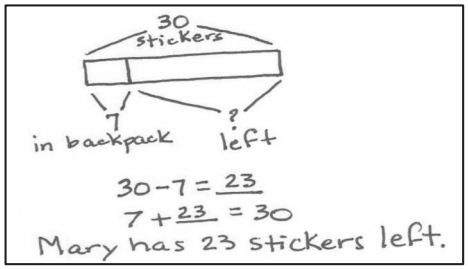


Making a ten and taking from ten are strategies that lay the foundation for understanding place value and the base ten system. These composition and decomposition methods powerfully pave the way for composing units and decomposing units of ten and a hundred when using the addition and subtraction algorithms in Modules 4 and 5. Students look for the opportunity to repeat patterns of reasoning both when calculating and in the context of word problems.

In Topic B, Application Problems contextualize learning as students apply strategies to problem solving using the RDW process. Students solve *add to, take from, put together/take apart* problem types with unknowns in different positions. They demonstrate their understanding of the situation by representing it with a drawing, number sentence, and statement.

Mary buys 30 stickers. She puts 7 in her friend's backpack. How many stickers does Mary have left?





Many students will enter Grade 2 drawing simple circles or 5-groups to reason through and represent a given situation. Encourage sense making, and accept all reasonable drawings. Drawing a tape diagram to accurately represent story situations comes with time and practice.

A Teaching Sequence Toward Mastery of Initiating Fluency with Addition and Subtraction Within 100

Objective 1: Add and subtract like units. (Lesson 3)

Objective 2: Make a ten to add within 20. (Lesson 4)

Objective 3: Make a ten to add within 100. (Lesson 5)

Objective 4: Subtract single-digit numbers from multiples of 10 within 100. (Lesson 6)

Objective 5: Take from ten within 20. (Lesson 7)

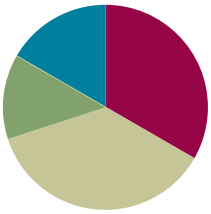
Objective 6: Take from ten within 100. (Lesson 8)

Lesson 3

Objective: Add and subtract like units.

Suggested Lesson Structure

Fluency Practice	(15 minutes)
Concept Development	(20 minutes)
Application Problem	(15 minutes)
Student Debrief	(10 minutes)
Total Time	**(60 minutes)**



Fluency Practice (15 minutes)

- Sprint: Related Facts (15 minutes)

Sprint: Related Facts (15 minutes)

Materials: (S) Related Facts Sprint

Note: Students use their fluency with easier problems to solve more complex addition and subtraction problems within 100. Also, as students get better with the Sprint routine, the time allotted for the Sprint continues to decrease.

Concept Development (20 minutes)

Materials: (S) Personal white board

Part 1: Add and subtract like units, ones, to solve problems within 100 (e.g., 5 + 2, 45 + 2, 7 – 2, 47 – 2).

T: What did you notice about today's Sprint?

S: I noticed a pattern. I saw 3 + 1 in the first 3 problems. → 3 + 1 = 4. So, I also know that 13 + 1 = 14 and 23 + 1 = 24. → I kept adding the same ones together in the first 3 problems, 3 + 1 = 4. But the tens changed.

T: Yes! Today's Sprint was filled with patterns. You can use easier facts like 3 + 1 to solve other problems like 13 + 1 and 23 + 1.

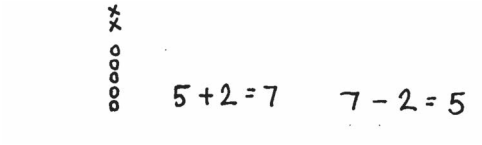
T: Turn and talk to your partner about other patterns you see in the Sprint.

S: (Identify sequences of problems.)

NOTES ON MULTIPLE MEANS OF REPRESENTATION:

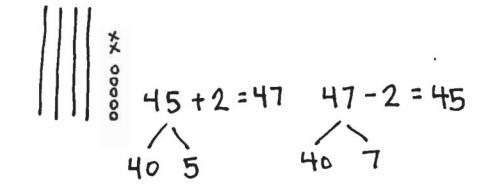
Consider demonstrating on the 100-bead Rekenrek for students who would benefit from a concrete model of the problems.

T: (Draw an image of 5 circles and 2 Xs as shown to the right.) Say addition and subtraction sentences this drawing represents.



S: 5 + 2 = 7. → 2 + 5 = 7. → 7 – 5 = 2. → 7 – 2 = 5.

T: Just like in our Sprint today, we can use problems like 5 + 2 = 7 or 7 – 2 = 5 to solve other problems. (Write 5 + 2 = 7 and 7 – 2 = 5. Add 4 quick tens to the drawing.)



T: 45 + 2 is…?

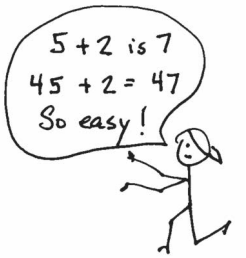
S: 47.

T: (Write 45 + 2 = 47.)

T: 47 – 2 is…?

S: 45.

T: (Write 47 – 2 = 45.)



T: What easier problem did you use to add and to subtract?

S: 5 + 2 = 7. → 7 – 2 = 5.

T: (Add 2 more quick tens to the drawing.) 67 – 2 is…?

S: 65.

T: (Add subtraction number sentences to the growing list.) What easier problem did we still use to subtract the ones?

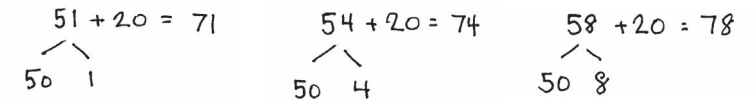
S: 7 – 2 = 5.

T: Tell me the number sentence in unit form.

S: 7 ones – 2 ones = 5 ones.

T: We didn't have to do anything to the tens except remember to put them together with the 5 ones!

Part 2: Add and subtract like units, tens, to solve problems within 100 (e.g., 51 + 20, 54 + 20, 71 – 20, 74 – 20).



T: (Write 51 + 20 on the board.) 51 + 20 is…?

S: 71.

T: How did you know?

S: I added 20 to 50 to get 70 and then added 1. → I drew a quick ten drawing. I added 2 more tens to my 5 tens. That gave me 7 tens and 1 one.

T: (Write the number bond to break apart 51 into 50 and 1.) How many tens are in 51?

S: 5 tens.

T: How many tens were we adding to 51?

S: 2 tens.

NOTES ON MULTIPLE MEANS OF ENGAGMENT:

Have students who struggle to see the like units draw quick tens to represent the problems. As soon as possible, have them visualize the quick tens to prevent overdependence on drawing.

"Pretend you drew quick tens. How many do you see? How many do you subtract? How many are left?"

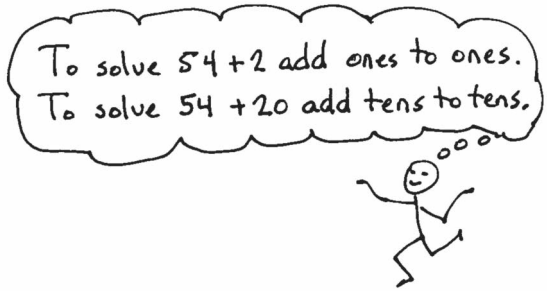
T: What easier problem did you use to help you solve 51 and 20? Talk to your partner.

S: 5 + 2 = 7. → 5 tens + 2 tens = 7 tens. → 50 + 20 = 70.

Repeat the same reasoning with 54 + 20 and 58 + 20.

T: Compare 54 + 2 to 54 + 20. Talk to your partner.

S: We start with the same number in both problems. → In one problem, we add 2 ones. In the other problem, we add 2 tens. → Adding 2 ones is not the same as adding 2 tens. 56 is much less than 74. → In one problem, we leave the ones alone, and in the other problem, we leave the tens alone.



T: (Write 71 – 20.) Break apart 71 as tens and ones.

S: 70 and 1.

T: (Write the number bond for 71.) What is 71 – 20?

S: 51.

T: How did you know?

S: 7 tens – 2 tens = 5 tens. → I took tens from tens. 70 – 20 = 50. Then I added 1. → I used an easier problem. I know 7 – 2 = 5, so 70 – 20 = 50.

Repeat the same reasoning with 73 – 20 and 76 – 20 and record.

T: Compare 73 – 20 to 73 – 2. Talk to your partner.

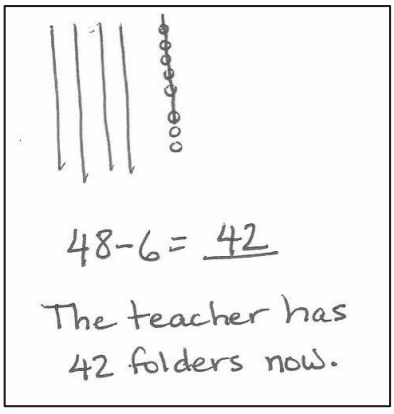
S: (Compare as previously.)

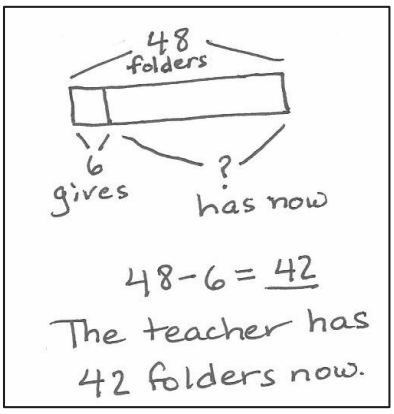
Repeat the process using the following sequence: 56 – 30, 56 – 3, 65 + 30, 35 + 60, 35 – 20, 35 – 30, 35 + 2, 32 + 5, 37 – 5, 87 – 5, 87 – 50. After each problem, ask students to share the easier problem that helped them solve. Ask students to identify if they are adding or subtracting tens or ones.

Application Problem (15 minutes)

Note: This Application Problem follows the Concept Development to allow students to apply their understanding to a *take from result unknown* problem. The allotted time period includes 5 minutes to solve the Application Problem and 10 minutes to complete the Problem Set.

The teacher has 48 folders. She gives 6 folders to the first table. How many folders does she have now?





NOTES ON MULTIPLE MEANS OF REPRESENTATION:

Rather than suggesting a strategy, choose to share two different solution strategies from students. Notice that the drawings represent student work at varying levels of sophistication. When sharing, encourage students to make connections between the models.

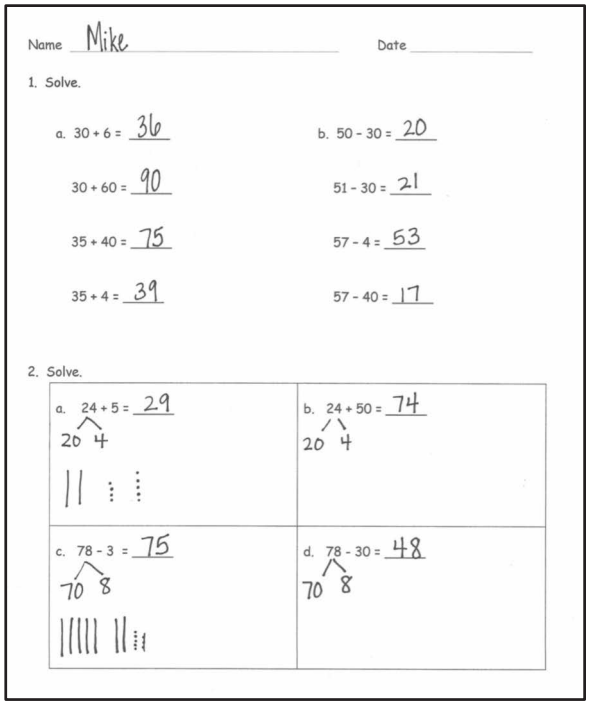
Note: This is the first application problem of Grade 2. The goal is to encourage all students to draw and solve using the RDW process. Some students may simply know the answer, so it is important to establish the purpose of the Application Problem of each lesson. It is the time to focus on understanding the situation presented in the problem and representing that situation with a drawing, a number sentence, and a statement of the answer. It is also the time for students to share their representations and their ways of thinking, which can help more students access problem-solving strategies. Save the tape diagram from this Application Problem to compare it to the tape diagram from Lesson 4 where students combine the parts rather than subtract a part.

Problem Set (10 minutes)

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. Some problems do not specify a method for solving. Students should solve these problems using the RDW approach used for Application Problems.

For some classes, it may be appropriate to modify the assignment by specifying which problems students should work on first. With this option, let the purposeful sequencing of the Problem Set guide your selections so that problems continue to be scaffolded. Balance word problems with other problem types to ensure a range of practice. Consider assigning incomplete problems for homework or at another time during the day.

Student Debrief (10 minutes)


Name Mike Date

1. Solve.

a. 30 + 6 = 36
30 + 60 = 90
35 + 40 = 75
35 + 4 = 39

b. 50 - 30 = 20
51 - 30 = 21
57 - 4 = 53
57 - 40 = 17

2. Solve.

a. 24 + 5 = 29 (20, 4)

b. 24 + 50 = 74 (20, 4)

c. 78 - 3 = 75 (70, 8)

d. 78 - 30 = 48 (70, 8)

Lesson Objective: Add and subtract like units.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

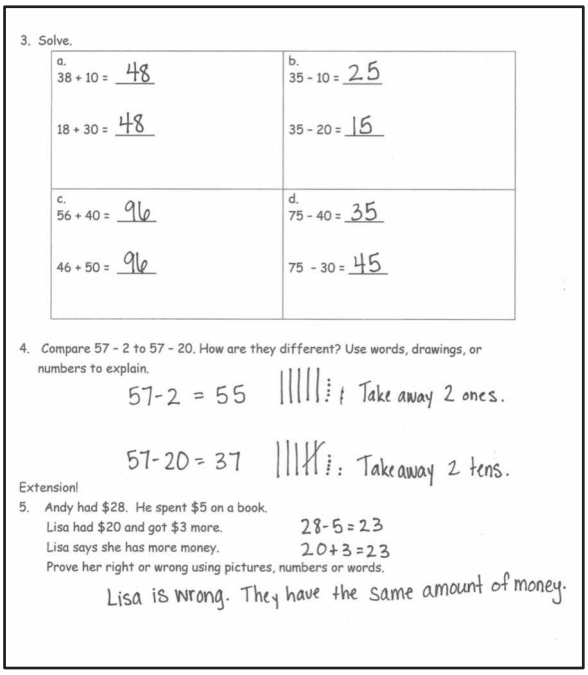
Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson.

Any combination of the questions below may be used to lead the discussion.

- What is another problem that could be added to Problem 1(a)?
- Compare 24 + 5 to 24 + 50 with your partner. What's different?
- Share your explanation from Problem 4. What is another pair of addition sentences that has this same relationship?
- Do you think you could teach what you learned to someone else? How?
- Can you figure out the math goal of today's lesson? What name would you give this lesson?

Exit Ticket (3 minutes)

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help with assessing students' understanding of the concepts that were presented in today's lesson and planning more effectively for future lessons. The questions may be read aloud to the students.



3. Solve.

a.	b.
38 + 10 = 48	35 - 10 = 25
18 + 30 = 48	35 - 20 = 15
c.	d.
56 + 40 = 96	75 - 40 = 35
46 + 50 = 96	75 - 30 = 45

4. Compare 57 - 2 to 57 - 20. How are they different? Use words, drawings, or numbers to explain.

57-2 = 55 Take away 2 ones.

57-20 = 37 Take away 2 tens.

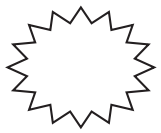
Extension!

5. Andy had $28. He spent $5 on a book.
Lisa had $20 and got $3 more.
Lisa says she has more money.
Prove her right or wrong using pictures, numbers or words.

28-5=23
20+3=23

Lisa is wrong. They have the same amount of money.

A

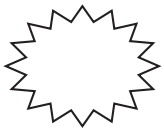
Number Correct: 

Name _____ Date _____

*Write the missing number. Pay attention to the + and – signs.

1.	3 + 1 = ___	16.	6 + 2 = ___
2.	13 + 1 = ___	17.	56 + 2 = ___
3.	23 + 1 = ___	18.	7 + 2 = ___
4.	1 + 2 = ___	19.	67 + 2 = ___
5.	11 + 2 = ___	20.	87 + 2 = ___
6.	21 + 2 = ___	21.	7 – 2 = ___
7.	31 + 2 = ___	22.	47 – 2 = ___
8.	61 + 2 = ___	23.	67 – 2 = ___
9.	4 – 1 = ___	24.	26 + 3 = ___
10.	14 – 1 = ___	25.	56 + ___ = 59
11.	24 – 1 = ___	26.	___ + 3 = 76
12.	54 – 1 = ___	27.	57 – ___ = 54
13.	5 – 3 = ___	28.	77 – ___ = 74
14.	15 – 3 = ___	29.	___ – 4 = 73
15.	25 – 3 = ___	30.	___ – 4 = 93

B

Number Correct: 

Name _____ Date _____

*Write the missing number. Pay attention to the + and – signs.

1.	2 + 1 = ___	16.	7 + 2 = ___
2.	12 + 1 = ___	17.	67 + 2 = ___
3.	22 + 1 = ___	18.	4 + 5 = ___
4.	3 + 2 = ___	19.	54 + 5 = ___
5.	13 + 2 = ___	20.	84 + 5 = ___
6.	23 + 2 = ___	21.	8 – 6 = ___
7.	43 + 2 = ___	22.	48 – 6 = ___
8..	63 + 2 = ___	23.	78 – 6 = ___
9.	5 – 1 = ___	24.	33 + 4 = ___
10.	15 – 1 = ___	25.	63 + ___ = 67
11.	25 – 1 = ___	26.	___ + 3 = 77
12.	45 – 1 = ___	27.	59 – ___ = 56
13.	5 – 4 = ___	28.	79 – ___ = 76
14.	15 – 4 = ___	29.	___ – 6 = 73
15.	25 – 4 = ___	30.	___ – 6 = 93

Name _____ Date _____

1. Solve.

a. 30 + 6 = _____

30 + 60 = _____

35 + 40 = _____

35 + 4 = _____

b. 50 – 30 = _____

51 – 30 = _____

57 – 4 = _____

57 – 40 = _____

2. Solve.

a. 24 + 5 = _____	b. 24 + 50 = _____
c. 78 – 3 = _____	d. 78 – 30 = _____

3. Solve.

a. 38 + 10 = _____ 18 + 30 = _____	b. 35 – 10 = _____ 35 – 20 = _____
c. 56 + 40 = _____ 46 + 50 = _____	d. 75 – 40 = _____ 75 – 30 = _____

4. Compare 57 – 2 to 57 – 20. How are they different? Use words, drawings, or numbers to explain.

Extension!

5. Andy had $28. He spent $5 on a book.
   Lisa had $20 and got $3 more.
   Lisa says she has more money.
   Prove her right or wrong using pictures, numbers, or words.

Name _____ Date _____

Solve.

1. 23 + 5 = _____	2. 68 – 5 = _____
3. 43 + 30 = _____	4. 76 – 60 = _____

Name _____ Date _____

1. Solve.

a. 20 + 7 = _____

20 + 70 = _____

62 + 3 = _____

62 + 30 = _____

b. 80 – 20 = _____

85 – 2 = _____

85 – 20 = _____

86 – 20 = _____

c. 30 + 40 = _____

31 + 40 = _____

35 + 4 = _____

45 + 30 = _____

d. 70 – 30 = _____

75 – 30 = _____

78 – 3 = _____

75 – 40 = _____

2. Solve.

a. 42 + 7 = _____	b. 24 + 70 = _____
c. 49 – 2 = _____	d. 98 – 20 = _____

3. Solve.

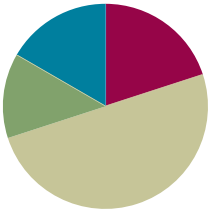
a. 16 + 3 = _____ 13 + 6 = _____	b. 37 – 3 = _____ 37 – 4 = _____
c. 26 + 70 = _____ 76 + 20 = _____	d. 97 – 50 = _____ 97 – 40 = _____

Lesson 4

Objective: Make a ten to add within 20.

Suggested Lesson Structure

Fluency Practice	(12 minutes)
Application Problem	(8 minutes)
Concept Development	(30 minutes)
Student Debrief	(10 minutes)
Total Time	**(60 minutes)**



Fluency Practice (12 minutes)

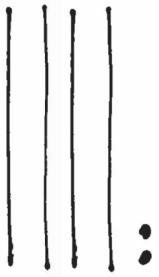
- Draw Tens and Ones (3 minutes)
- Make Ten (3 minutes)
- Make the Next Ten Within 100 (4 minutes)
- Take Out One (2 minutes)

Draw Tens and Ones (3 minutes)

Materials: (T) Linking cubes with ten-sticks and extra cubes, place value chart (S) Personal white board

Note: This fluency activity reviews place value as students analyze two representations of two-digit numbers.

T: Draw the number of cubes I show with quick tens and ones.
T: (Show 2 linking cube ten-sticks and 4 ones.)
S: (Draw as pictured to the right.)
T: Show me your boards. Tell me the number.
S: 24.
T: Draw the number I show with quick tens and ones.
T: (Write the number 42 on the place value chart.)
S: (Draw as pictured to the right.)
T: Tell me the number.
S: 42.



For the next minute, represent 18 and 81, 37 and 73, 29 and 92, alternating between showing the smaller number of each pair with cubes and the larger number with the place value chart.

Make Ten (3 minutes)

Materials: (S) Personal white board

Note: This is a foundational skill for mastery of sums and differences to 20.

T: I'll say a number, and you say how many more to make ten.
T: 9. Get ready.
S: 1.
T: Write the addition sentence. (Pause.) Show me your boards.
S: (Show 9 + 1 = 10.)
T: (Scan each board, and accept 1 + 9 = 10, 10 = 9 + 1, etc.)
T: 8. (Pause as students write.) Get ready.
S: 2.
T: Write the addition sentence. (Pause.) Show me your boards.
S: (Show 8 + 2 = 10.)

Continue with the following possible sequence: 2, 5, 6, 4, 7, and 3.

Make the Next Ten Within 100 (4 minutes)

Materials: (T) Rekenrek (S) Personal white board

Note: In this fluency activity, students apply their knowledge of partners to ten to find analogous partners to 20, 30, and 40 to prepare for today's lesson. Keep them motivated to use the patterns by removing the Rekenrek at times.

T: (Show 19.) Say the number.
S: 19.
T: Write the number sentence, starting with 19, to get to or make the next ten on your personal white board.
S: (Write 19 + 1 = 20.)
T: (Scan the boards.) Tell me the addition sentence.
S: 19 + 1 = 20.
T: (Move 1 bead to make 20 as students answer.)
T: (Show 39.) Say the number.
S: 39.
T: Write the number sentence, starting with 39, to make the next ten on your personal white board.
S: (Write 39 + 1 = 40.)
T: (Scan the boards.) Tell me the addition sentence.
S: 39 + 1 = 40.
T: (Move 1 bead to make 40 as students answer.)

Continue with the following possible sequence: 15, 35, 85; 18, 48, 68; 12, 52, and 92.

NOTES ON MULTIPLE MEANS OF REPRESENTATION:

Once the Rekenrek is removed, encourage students who need support to visualize the beads (ten-frames or 5-groups), or guide them to use fingers to model the number of ones in order to determine how many more make ten.

Take Out One (2 minutes)

Materials: (S) Personal white board

Note: In the lesson, students add 9 and 6 by adding 9 and 1 and 5. They "take out 1" from 5.

T: Let's take out 1 from each number. I say 5. You write the number bond and say the two parts, 1 and 4.

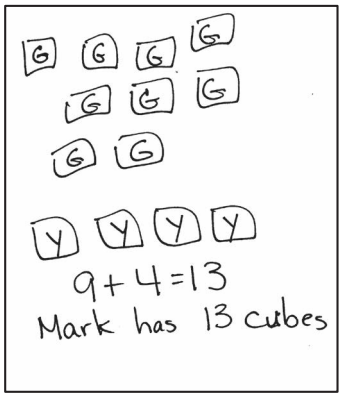
T: 5.

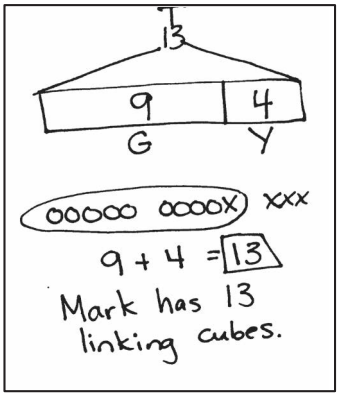
S: (Draw number bond.) 1 and 4.

Continue with the following possible sequence: 3, 10, 4, 7, 9, 8, and 6.

Application Problem (8 minutes)

Mark had a stick of 9 green linking cubes. His friend gave him 4 yellow linking cubes. How many linking cubes does Mark have now?





Note: This *add to result unknown* problem's tape diagram can be compared to that of Lesson 3 when a part was subtracted.

NOTES ON MULTIPLE MEANS OF REPRESENTATION:

"Mark's Linking Cubes" bridges into today's Concept Development of making a ten to add. Rather than teach the make ten strategy during the Application Problem, notice what strategies students are independently using, and integrate these observations into the Concept Development. During the Student Debrief, consider coming back to the Application Problem, and invite students to apply today's learning to show another way to solve the problem.

Concept Development (30 minutes)

Materials: (S) Personal white board

Part 1: Making ten from an addend of 9, 8, or 7.

Note: In Grade 1, students used ten-sticks and quick ten drawings extensively when making ten. Now in Grade 2, the objective is to work at the numerical level as soon as possible.

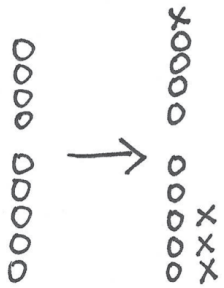
T: (Write 9 + 4 on the board.)

T: Let's draw to solve 9 + 4 using circles and Xs.

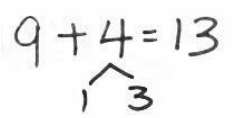
NOTES ON MULTIPLE MEANS OF ENGAGEMENT:

If time or precision is a factor, create templates of pre-drawn circles to model addends of 9, 8, and 7. Then, students can attend to drawing Xs to complete the ten and model the remainder of the problem.

T: (Quickly draw and count aloud 9 circles in a 5-group column as seen in the first image.)
T: How many Xs will we add?
S: 4 Xs.
T: (Using the X symbol, complete the ten and draw the other 3 Xs to the right as seen in the second image.)
T: Did we make a ten?
S: Yes!



T: Our 9 + 4 is now a ten-plus fact. What fact can you see in the drawing?
S: 10 + 3 = 13.
T: 10 + 3 equals?
S: 13.
T: So, 9 + 4 equals?
S: 13. (Write the solution.)
T: What did we take out of 4 so that we could make 10?
S: 1.
T: (Draw the number bond under 4 as shown to the right.)
T: (Write 9 + 5.)
T: Solve using a number bond. (If students want or need to draw, allow them to.)



Continue with the following possible sequence: 9 + 6, 9 + 7, 8 + 9, 8 + 3, 8 + 4, 8 + 7, and 7 + 5. Have students explain their work to a partner.

Part 2: Observing patterns.

T: Look at our list of problems where one part, or addend, is 9. Tell your partner what you notice about adding to 9.
S: You get 1 out! → The answer is 10 and 1 less than the other addend.
T: Look at the problems with 8 as an addend. Tell your partner what you notice.
S: You get 2 out! → You always take 2 out of the other addend.
T: How is solving 9 + 4 and 8 + 4 different?
S: We used 2 to make 10 when we added to 8 and 1 to make 10 when we added to 9. → We used a different number bond.

Problem Set (10 minutes)

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. Some problems do not specify a method for solving. This is an intentional reduction of scaffolding. Students should solve these problems using the RDW approach used for Application Problems.

Student Debrief (10 minutes)

Lesson Objective: Make a ten to add within 20.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

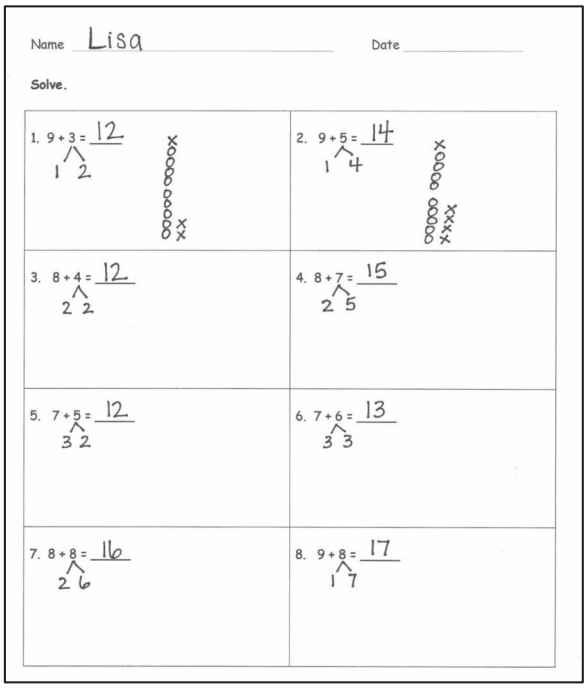
Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson.

Any combination of the questions below may be used to lead the discussion.

- Let's look at Problems 11–14. How are the problems the same and different?
- Do you notice a pattern that will help you memorize your 9-plus facts? What other patterns do you notice?
- Explain the strategy we reviewed today. Can you think of another problem that the make ten strategy will help us solve?
- Can you figure out the math goal of today's lesson? What name would you give this lesson?

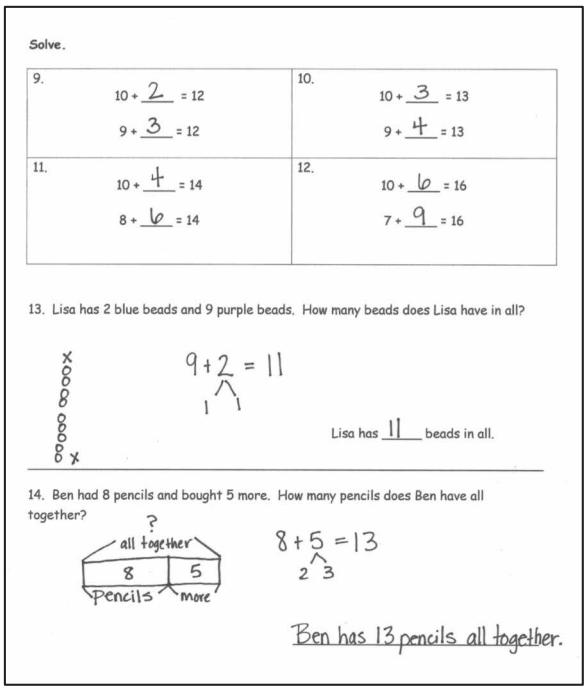
Exit Ticket (3 minutes)

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help with assessing students' understanding of the concepts that were presented in today's lesson and planning more effectively for future lessons. The questions may be read aloud to the students.


Name Lisa Date

Solve.

1. 9 + 3 = 12 (1, 2)
2. 9 + 5 = 14 (1, 4)
3. 8 + 4 = 12 (2, 2)
4. 8 + 7 = 15 (2, 5)
5. 7 + 5 = 12 (3, 2)
6. 7 + 6 = 13 (3, 3)
7. 8 + 8 = 16 (2, 6)
8. 9 + 8 = 17 (1, 7)


Solve.

9. 10 + 2 = 12; 9 + 3 = 12
10. 10 + 3 = 13; 9 + 4 = 13
11. 10 + 4 = 14; 8 + 6 = 14
12. 10 + 6 = 16; 7 + 9 = 16

13. Lisa has 2 blue beads and 9 purple beads. How many beads does Lisa have in all?

9 + 2 = 11 (1, 1)

Lisa has 11 beads in all.

14. Ben had 8 pencils and bought 5 more. How many pencils does Ben have all together?

8 + 5 = 13 (2, 3)

Ben has 13 pencils all together.

Name _____ Date _____

Solve.

1. 9 + 3 = _____	2. 9 + 5 = _____
3. 8 + 4 = _____	4. 8 + 7 = _____
5. 7 + 5 = _____	6. 7 + 6 = _____
7. 8 + 8 = _____	8. 9 + 8 = _____

Solve.

9. 10 + _____ = 12 9 + _____ = 12	10. 10 + _____ = 13 9 + _____ = 13
11. 10 + _____ = 14 8 + _____ = 14	12. 10 + _____ = 16 7 + _____ = 16

13. Lisa has 2 blue beads and 9 purple beads. How many beads does Lisa have in all?

Lisa has _____ beads in all.

14. Ben had 8 pencils and bought 5 more. How many pencils does Ben have altogether?

Name _____ Date _____

Solve.

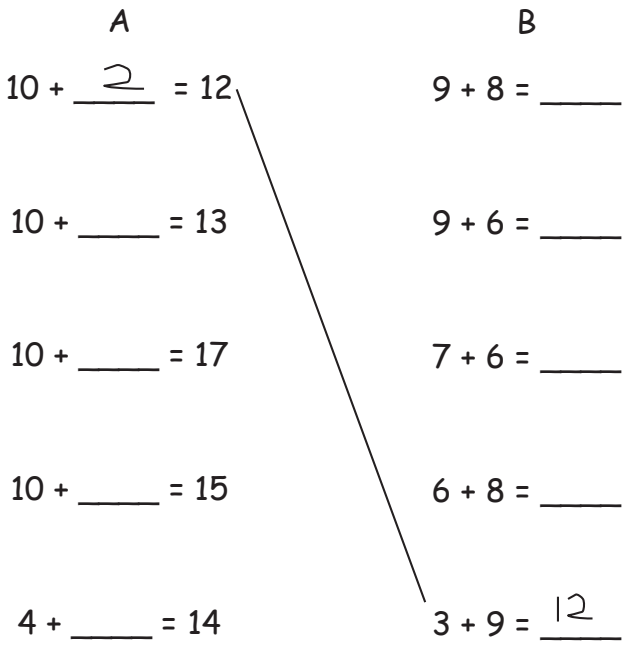
1. 9 + 6 = ____	2. 8 + 5 = ____

Name _____ Date _____

Solve.

1. 8 + 4 = ____ / \ 2 2 8 + 2 = 10 10 + 2 = 12	2. 9 + 7 = ____
3. 9 + 3 = _____	4. 8 + 6 = _____
5. 7 + 6 = _____	6. 7 + 8 = _____
7. 8 + 8 = _____	8. 8 + 9 = _____

9. Solve and match.



10. Ronnie uses 5 brown bricks and 8 red bricks to build a fort. How many bricks does Ronnie use in all?

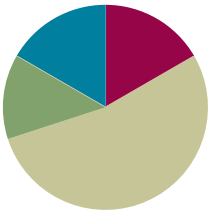
Ronnie uses _____ bricks.

Lesson 5

Objective: Make a ten to add within 100.

Suggested Lesson Structure

Fluency Practice	(10 minutes)
Concept Development	(22 minutes)
Application Problem	(18 minutes)
Student Debrief	(10 minutes)
Total Time	**(60 minutes)**



Fluency Practice (10 minutes)

- Happy Counting: Say Ten Way (2 minutes)
- Put Together/Take Apart (3 minutes)
- Make the Next Ten Within 100 (5 minutes)

Happy Counting: Say Ten Way (2 minutes)

Note: Continued work with counting the Say Ten Way gives students confidence and allows them to build proficiency.

T: Let's Happy Count the Say Ten Way. Let's start at 6 tens 2. Ready?
S: 6 tens 2, 6 tens 1, 6 tens, 5 tens 9, 6 tens, 6 tens 1, 6 tens, 5 tens 9, 5 tens 8, 5 tens 9, 6 tens.
T: Excellent! Try it for 30 seconds with your partner. Partner B, you are the teacher today.

NOTES ON MULTIPLE MEANS OF ACTION AND EXPRESSION:

If students need more support to understand two-digit numbers as tens and ones, use the Hide Zero cards as used in Lesson 2.

Partner A models the tens; Partner B, the ones. Pairs move together and overlap the cards to model the number (e.g., 24). Likewise, they move apart for the *break apart* portion, separating the cards to model the value of the tens and ones (e.g., 20 and 4).

Put Together/Take Apart (3 minutes)

Note: Students remember the relevance of ten-plus facts to larger numbers.

Put Together

T: When I say a ten-plus fact, you say the answer on my signal.
T: 10 + 5. (Signal.)
S: 15.
T: 10 + 2.
S: 12.

Continue with the following possible sequence: 10 + 9, 20 + 1, 20 + 4, 50 + 4, 80 + 4, 30 + 8, 40 + 8, 70 + 8, 90 + 8.

Take Apart

T: Now, when I say 13, you say 10 + 3.
T: 13. (Signal.)
S: 10 + 3.

Continue with the following possible sequence: 17, 11, 16, 18, 28, 78, 14, 34, and 94.

Make the Next Ten Within 100 (5 minutes)

Materials: (T) Rekenrek (S) Personal white board

Note: In this fluency activity, students apply their knowledge of partners to ten to find analogous partners to 20, 30, and 40, which prepares them for today's lesson.

For 30 seconds, say numbers 0–10. Students say partners to ten at the signal. Then, remove the Rekenrek.

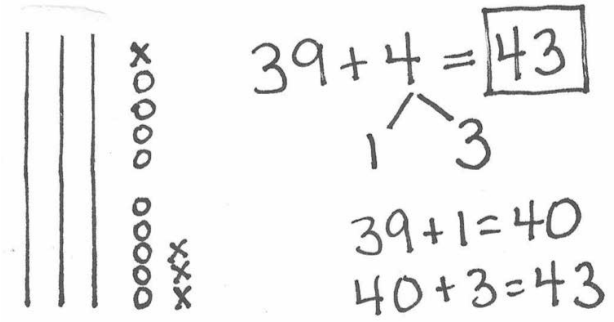
T: (Show 9.) Say the number.
S: 9.
T: Tell me the number sentence to make ten.
S: 9 + 1 = 10.
T: (Move 1 bead to make 10. Show 19.)
T: Say the number.
S: 19.
T: Write the number sentence to make 20.
S: 19 + 1 = 20.

Continue with the following possible sequence: 29, 39; 5, 15, 25, 35; 8, 18, 28, 38; 7, 17, 27, and 37.

Concept Development (22 minutes)

Materials: (S) Personal white board

T: (Write 39 + 4.) Talk to your partner about how you would solve this problem.
S: We can draw 39 circles and 4 Xs and count them all. → I can count on starting at 39. 40, 41, 42, 43. → You can add 1 to make 40 and add the 3. 40 + 3 = 43.
T: Draw 39 using quick tens and circles.
S: (Draw.)
T: Show me your board! (Pause. Ask students to redraw to show 9 either as a 5-group column or in a ten-frame configuration.)
T: Now draw 4 Xs. (Quietly remind certain students to complete the ten first.)
T: Write the number sentence with the solution.



T: 39 + 4 equals?
S: 43.
T: 39 + 4 equals 40 plus …?
S: 3.
T: (Write 39 + 4 = 40 + 3.)
T: Let's show 39 + 4 using a number bond. We started with 39. How did we break apart 4 so we can make 40?
S: 1 and 3. (Write number bond as shown in the image on the previous page.)

Repeat the process with the following suggested sequence: 49 + 5, 79 + 5, 48 + 5, 78 + 5, 7 + 29, 7 + 48, and 77 + 6. Students should demonstrate understanding using at least one representation such as quick tens and ones or number bonds.

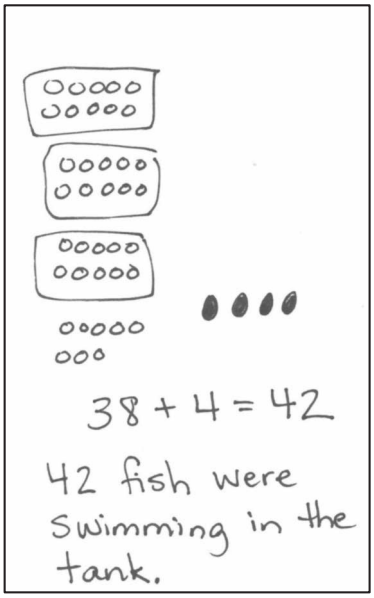
NOTES ON MULTIPLE MEANS OF ENGAGEMENT:

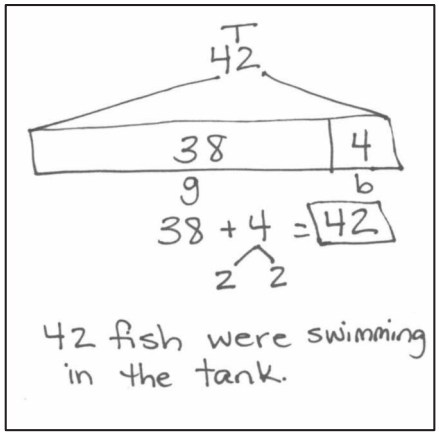
Scaffold questioning to guide connections, as in 49 + 5:

- How many more does 9 need to make a 10? How about 19? 29?
- Where can we get 1 more?
- What should we take out of the other addend?
- How does your number bond match your quick ten drawing?

Application Problem (18 minutes)

Mia counted all the fish in a tank. She counted 38 goldfish and 4 black fish. How many fish were in the tank?





NOTES ON APPLICATION PROBLEMS:

These are the four steps of the problem-solving process:

1. Read.
2. Draw.
3. Write a number sentence.
4. Write a word sentence.

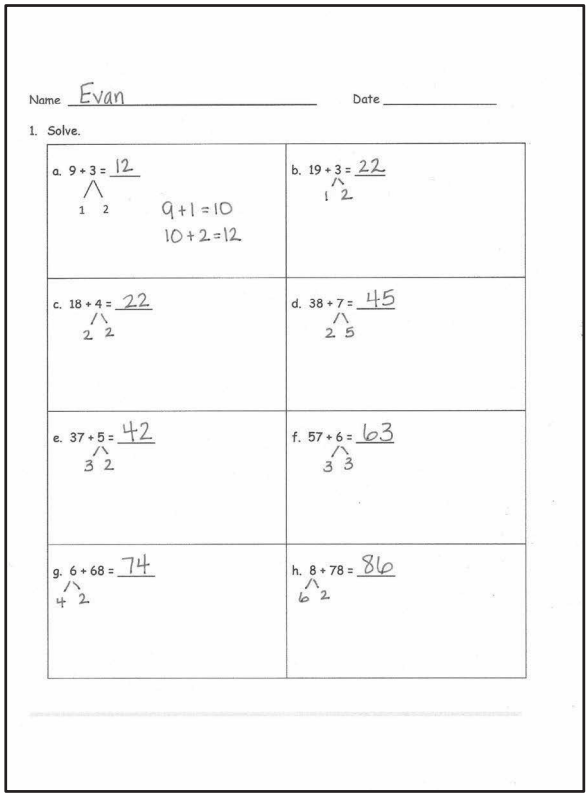
This process provides accommodation for students with disabilities and English language learners since it is both visual and kinesthetic.

Note: If students do not use the tape diagram, model it after two students have shared their solution strategies. Be sure to make connections between the different representations in students' drawings. "What part of the drawing using the ten-frames represents the goldfish?" "What part of the tape diagram represents the goldfish?" "Which drawing is more efficient?"

This Application Problem follows the Concept Development to provide an opportunity for students to apply the make ten strategy in the context of a *put together total unknown* problem. The allotted time period includes 8 minutes to solve the Application Problem and 10 minutes to complete the Problem Set.

Problem Set (10 minutes)

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. For some classes, it may be appropriate to modify the assignment by specifying which problems they work on first. Some problems do not specify a method for solving. Students should solve these problems using the RDW approach used for Application Problems.


Name Evan Date

1. Solve.

a. 9 + 3 = 12 (1, 2) 9+1=10 10+2=12

b. 19 + 3 = 22 (1, 2)

c. 18 + 4 = 22 (2, 2)

d. 38 + 7 = 45 (2, 5)

e. 37 + 5 = 42 (3, 2)

f. 57 + 6 = 63 (3, 3)

g. 6 + 68 = 74 (4, 2)

h. 8 + 78 = 86 (6, 2)

Student Debrief (10 minutes)

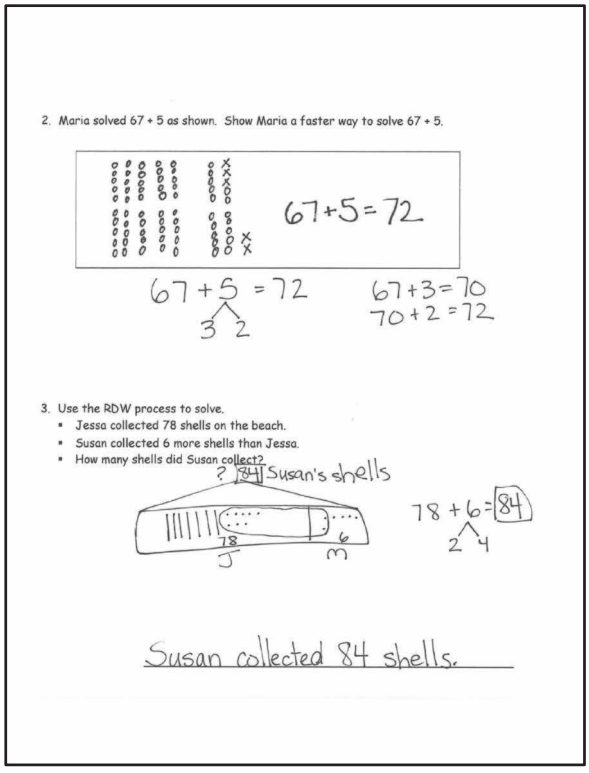
Lesson Objective: Make a ten to add within 100.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson.

Any combination of the questions below may be used to lead the discussion.

- Look at Problems 1(a) and (b). How does knowing 9 + 3 help you solve 19 + 3?
- What other patterns do you notice in the Problem Set? Explain how the patterns help you solve the problems.
- Compare 43 + 5 and 48 + 5. What is different about them?
- Can you figure out the math goal of today's lesson? What name would you give this lesson?


2. Maria solved 67 + 5 as shown. Show Maria a faster way to solve 67 + 5.

67+5=72

67 + 5 = 72 (3, 2)

67+3=70 70+2=72

3. Use the RDW process to solve.
- Jessa collected 78 shells on the beach.
- Susan collected 6 more shells than Jessa.
- How many shells did Susan collect?

? 84 Susan's shells

78 J 6 S

78 + 6 = 84 (2, 4)

Susan collected 84 shells.

Exit Ticket (3 minutes)

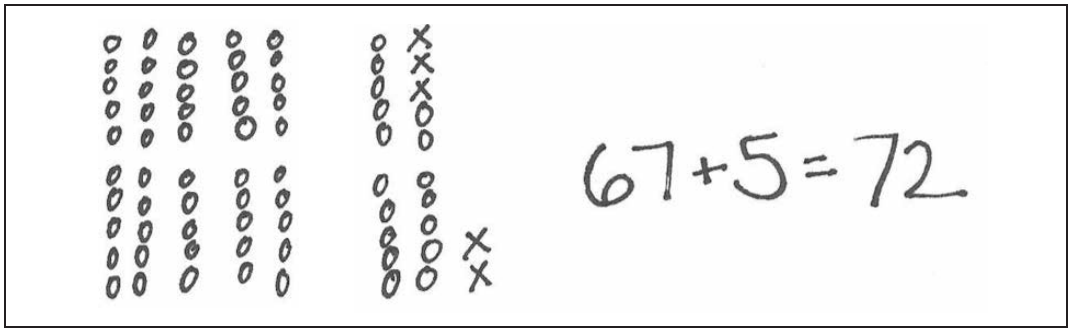
After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help with assessing students' understanding of the concepts that were presented in today's lesson and planning more effectively for future lessons. The questions may be read aloud to the students.

Name _____ Date _____

1. Solve.

a. 9 + 3 = _____  	b. 19 + 3 = _____
c. 18 + 4 = _____	d. 38 + 7 = _____
e. 37 + 5 = _____	f. 57 + 6 = _____
g. 6 + 68 = _____	h. 8 + 78 = _____

2. Maria solved 67 + 5 as shown. Show Maria a faster way to solve 67 + 5.



3. Use the RDW process to solve.

Jessa collected 78 shells on the beach.
Susan collected 6 more shells than Jessa.
How many shells did Susan collect?

Name _____ Date _____

Solve.

a. 39 + 4 = ____	b. 58 + 7 = ____

Name _____ Date _____

1. Solve.

a. 9 + 3 = _____  	b. 29 + 5 = _____
c. 49 + 7 = _____	d. 59 + 6 = _____
e. 18 + 4 = _____	f. 48 + 6 = _____
g. 58 + 6 = _____	h. 78 + 8 = _____

2. Solve.

a. 67 + 5 = _____	b. 87 + 6 = _____
c. 6 + 59 = _____	d. 7 + 78 = _____

3. Use the RDW process to solve.

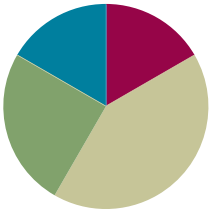
There were 28 students at recess. A group of 7 students came outside to join them. How many students are there now?

Lesson 6

Objective: Subtract single-digit numbers from multiples of 10 within 100.

Suggested Lesson Structure

Fluency Practice	(10 minutes)
Concept Development	(25 minutes)
Application Problem	(15 minutes)
Student Debrief	(10 minutes)
Total Time	**(60 minutes)**



Fluency Practice (10 minutes)

- One or Two Less (5 minutes)
- Take from Ten (2 minutes)
- Take Out Ten (3 minutes)

One or Two Less (5 minutes)

Note: Students have been counting up and down across the ten in fluency activities such as Happy Counting since Kindergarten. In this lesson, they extend their knowledge about the change in decades to subtract from multiples of ten.

T: (Show 20 beads.) How many beads?
S: 20.
T: (Push one bead back.) 1 less than 20 is …?
S: 19.
T: 20 – 1 is …? Tell me the complete number sentence.
S: 20 – 1 = 19.

Continue with the following possible sequence: 30, 40, 50, 60, 70, 80, 90, 100. Repeat with 2 less.

Take from Ten (2 minutes)

Note: This activity develops the automaticity necessary to subtract fluently from the ten when using the take from ten strategy in Lessons 6, 7, and 8.

T: When I say 10 – 9, you say 10 – 9 = 1. Ready? 10 – 9.
S: 10 – 9 = 1.
T: 10 – 5.
S: 10 – 5 = 5.

NOTES ON MULTIPLE MEANS OF ACTION AND EXPRESSION:

During Fluency Practice, students build on their prior knowledge of place value from Grade 1. Design math centers that use place value materials such as:

- The Rekenrek: Students make ten, add/subtract across ten, or build numbers 11–100.
- Ten-frames: Students do ten-frame flash (with add or take away 1), two more/less, double it.

Continue with the following sequence: 10 – 2, 10 – 4, 10 – 6, 10 – 7, 10 – 3, and 10 – 8.

T: When I say 1, you say 9. Ready? 1.
S: 9.
T: 2.
S: 8.

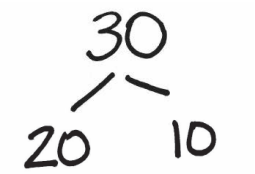
Continue with the following sequence: 5, 0, 4, 7, 3, 8, 6, and 10.

Take Out Ten (3 minutes)

Material: (S) Personal white board

Note: Taking out 10 prepares students for subtracting a single-digit from a two-digit number where there are not enough ones.

T: Let's take out 10 from each number. I say 30. You draw a number bond for 30 with parts 20 and 10. Show the ten on the right.
T: 30. Show me your board.
S: (Show number bond).
T: Read the parts from left to right.
S: 20 and 10.

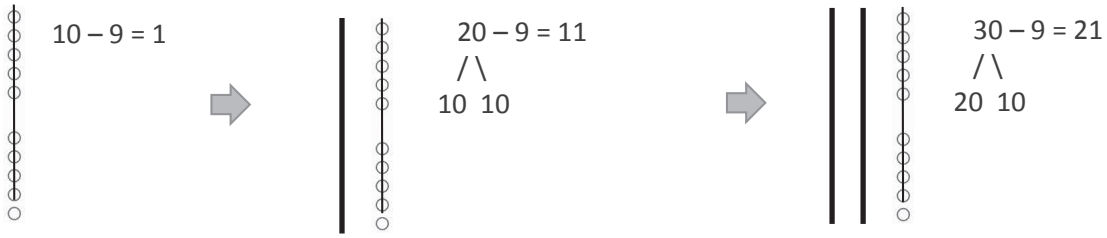


Continue with the following possible sequence: 50, 40, 60, 80, 70, 90, and 100. If time permits, invite partners to take turns giving each other more practice with numbers between 20 and 100.

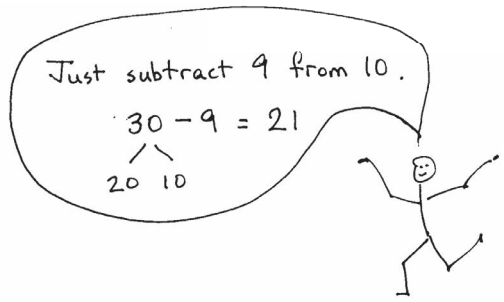
Concept Development (25 minutes)

Materials: (S) Personal white board

Part 1: Subtraction of single-digit numbers from 20, 30, 40, 50, 60, 70, 80, and 90 using drawings.



T: (Draw a 5-group column.)
T: 10 – 9 is …? (Cross off 9 quickly with one line.)
S: 1.
T: (Draw a quick ten to the left of the 5-group column.)
T: 20 – 9 is …?
S: 11.



T: Watch. (Write 20 – 9 = ____, and show a number bond that breaks apart 20 into 10 and 10. Write 10 – 9 = 1 and 10 + 1 = 11.)

T: Talk to your partner. How do the two number sentences relate to what we showed with our drawing? (Gesture to the picture.)

S: The 10 minus 9 shows how we took from the ten. → The 10 and the 1 are the parts that are left. We add them together, so 20 – 9 = 11. → It's like Take Out Ten! We broke 20 into 10 and 10, so we could take 9 from the ten. Then we added what was left.

T: (Draw another quick ten, as shown.)

T: 30 – 9 is …?

S: 21.

T: Explain to your partner how 10 – 9 helps us to solve 30 – 9.

S: They're the same, but 30 has 2 more tens. → 10 is inside 30 so you take from the ten. → I know 30 is 20 + 10 and 10 – 9 is 1, so then I added 20 and 1.

T: Yes! Knowing our partners of ten makes that easy! You noticed we always took from ten. After that, we put the parts that are left together.

Part 2: Subtraction of single-digit numbers from 20, 30, 40, 50, 60, 70, 80, and 90 without drawings.

Note: Following Part 1's work with the teacher drawing quick tens, model the use of just the number bond to solve. However, give students the option to draw.

T: Watch. (Write 40 – 9 = ___ with a number bond breaking apart 40 into 30 and 10.)

T: What is the first step to solve?

S: Take from 10.

T: Give me the number sentence to take from ten.

S: 10 – 9 = 1.

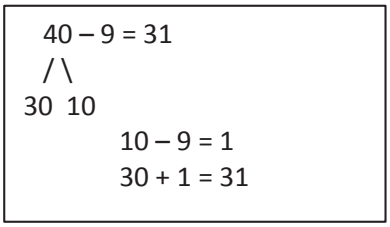
T: (Write 10 – 9 = 1.) What is the next step?

S: Add the parts that are left.

T: Give me the number sentence.

S: 30 + 1 = 31.

T: (Write 30 + 1 = 31.)



Give students a variety of problems from simple to complex. Encourage them to solve without the quick ten and 5-group column. Use this possible sequence:

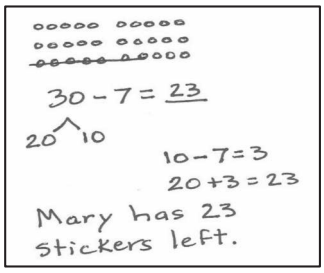
20 – 5	70 – 5
30 – 5	80 – 6
40 – 9	80 – 6
50 – 9	100 – 8
60 – 5	100 – 7

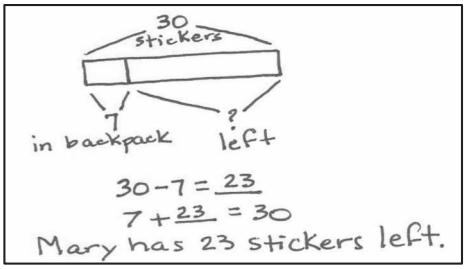
Allow time for students to work on their personal white boards so that they practice many problems. As students demonstrate proficiency, allow them to work on the Problem Set.

Application Problem (15 minutes)

Note: This Application Problem follows the Concept Development to allow students to apply their understanding to a *take from result unknown* problem. The allotted 15 minutes includes 5 minutes to solve the Application Problem and 10 minutes to complete the Problem Set.

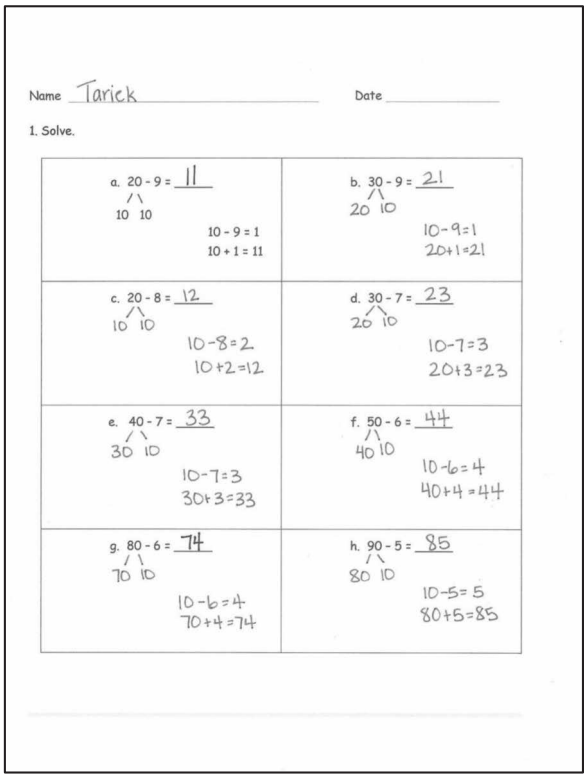
Mary buys 30 stickers. She puts 7 in her friend's backpack. How many stickers does Mary have left?





Problem Set (10 minutes)

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. For some classes, it may be appropriate to modify the assignment by specifying which problems they work on first. Some problems do not specify a method for solving. Students should solve these problems using the RDW approach used for Application Problems.



Student Debrief (10 minutes)

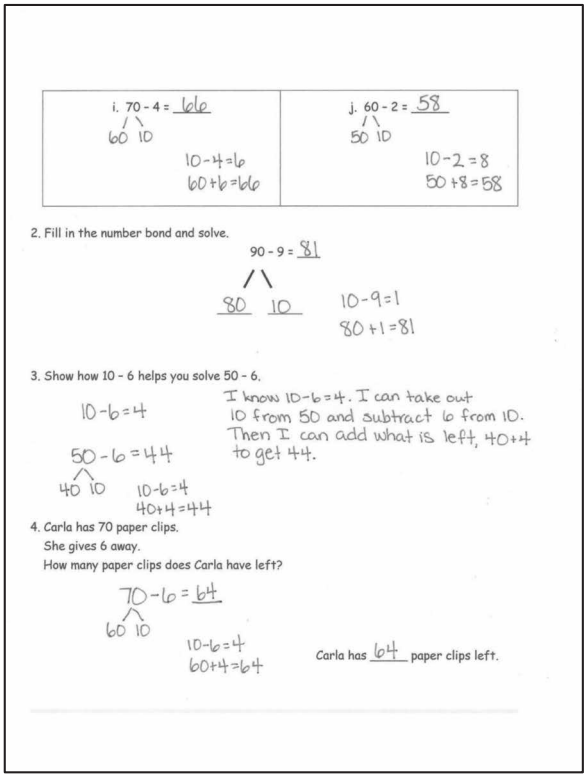
Lesson Objective: Subtract single-digit numbers from multiples of 10 within 100.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson.

Any combination of the questions below may be used to lead the discussion.

- Explain how you solved Problem 1(b).
- How did number bonds help you solve our subtraction problems today?
- Can you figure out the goal of today's lesson? What name would you give our lesson today?
- Do you think you could teach what you learned to someone else? How?



Exit Ticket (3 minutes)

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help with assessing students' understanding of the concepts that were presented in today's lesson and planning more effectively for future lessons. The questions may be read aloud to the students.

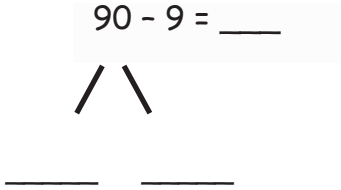
Name _____ Date _____

1. Solve.

a. 20 – 9 = _____ / \ 10 10 10 – 9 = 1 10 + 1 = 11	b. 30 – 9 = _____
c. 20 – 8 = _____	d. 30 – 7 = _____
e. 40 – 7 = _____	f. 50 – 6 = _____
g. 80 – 6 = _____	h. 90 – 5 = _____

i. 70 – 4 = _____	j. 60 – 2 = _____

2. Fill in the number bond and solve.



3. Show how 10 – 6 helps you solve 50 – 6.

4. Carla has 70 paper clips.
   She gives 6 away.
   How many paper clips does Carla have left?

Carla has _____ paper clips left.

Name _____ Date _____

Solve.

1. 70 – 4 = _____	2. 60 – 3 = _____

Name _____ Date _____

1. Take out ten.

30 / \ 20 10	40	50
70	60	80

2. Solve.

10 – 1 = _____	10 – 4 = _____	10 – 9 = _____
10 – 7 = _____	10 – 2 = _____	10 – 5 = _____

3. Solve.

a. 20 – 9 = 11 / \ 10 10 10 – 9 = 1 10 + 1 = 11	b. 30 – 9 = _____

c. 40 – 8 = _____	d. 50 – 8 = _____
e. 60 – 7 = _____	f. 70 – 7 = _____
g. 80 – 6 = _____	h. 90 – 5 = _____

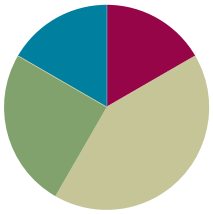
4. Show how 10 – 4 helps you solve 30 – 4.

Lesson 7

Objective: Take from 10 within 20.

Suggested Lesson Structure

Fluency Practice	(10 minutes)
Concept Development	(25 minutes)
Application Problem	(15 minutes)
Student Debrief	(10 minutes)
Total Time	**(60 minutes)**



Fluency Practice (10 minutes)

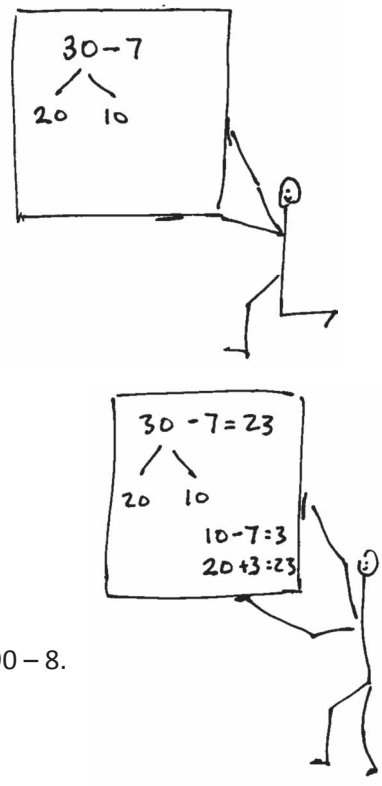
- Take Out Ten and Subtract (10 minutes)

Take Out Ten and Subtract (10 minutes)

Materials: (S) Personal white board

Note: Taking out ten reviews subtracting a single digit from a two-digit multiple of ten ones.

T: Write 30 – 7 on your boards.
T: Let's take out 10 from 30 using a number bond. Show the ten on the right.
T: Show me your board.
S: (Show number bond.)
T: Read the parts from left to right.
S: 20 and 10.
T: 10 – 7 is …?
S: 3.
T: 20 + 3 is …?
S: 23.
T: So, 30 – 7 is …?
S: 23.

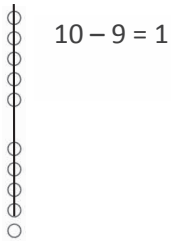


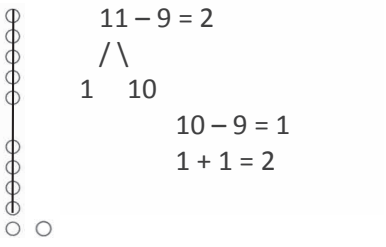
Continue with the following possible sequence: 40 – 7, 50 – 5, 70 – 5, 80 – 8, 90 – 8.

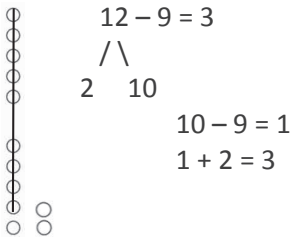
Concept Development (25 minutes)

Materials: (S) Personal white board, 30 large or small paper clips

Part 1: Subtraction of single-digit numbers from teen numbers using drawings.





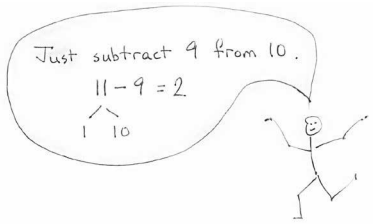


T: (Draw a 5-group column.)

T: 10 – 9 is …? (Cross off 9 all at once.)

S: 1.

T: (Draw a one to the right of the 5-group column, as shown above, to model eleven.)



T: 11 – 9 is …?

S: 2.

T: Watch. (Write 11 – 9 = ____. Then show a number bond that breaks apart 11 into 1 and 10. Write 10 – 9 = 1 and 1 + 1 = 2.)

T: Talk to your partner. How do the two number sentences relate to what we drew? (Gesture to the picture.)

S: The 10 minus 9 shows how we took from the ten.
→ We put together the parts that are left, the 1 and 1.
→ It's like Take Out Ten! We broke 11 into 1 and 10, so we could take 9 from ten. Then, we added the one.

T: (Draw another one, as shown above in the third image, to model 12.)

T: 12 – 9 is…?

S: 3.

T: (Write 12 – 9 = 3. Then, show a number bond that breaks apart 12 into 2 and 10. Write 10 – 9 = 1 and 1 + 2 = 3.)

T: Explain to your partner how 10 – 9 helps us to solve 12 – 9.

S: 10 – 9 = 1 is an easier problem because I know my partners to ten. 1 + 2 is super easy! → 12 just has 2 more ones than 10, so the answer is just 2 more than 10 – 9.

T: Yes! Knowing our partners of ten makes that easier! You noticed we always took from ten. After that, we put the parts that are left together.

NOTES ON MULTIPLE MEANS OF ENGAGEMENT:

As students become proficient with making an easier problem, they may use alternate methods to solve. Accept any mathematically reasonable strategy. For example, to solve 13 – 8, students may think 13 – 3 = 10 and 10 – 5 = 5. Another strategy is to count on by thinking 8 + ___ = 13. 8 + 2 = 10 and 10 + 3 = 13, so 2 + 3 = 5. Encourage students to share their thinking with the class.

Part 2: Subtraction of single-digit numbers from teen numbers without drawings.

Note: Following Part 1's work with drawing the 5-group column, model the use of just the number bond to solve. However, give students the option to draw or use their fingers.

T: Watch how I solve without a drawing. (Write 12 – 9 = ___ with a number bond breaking apart 12 into 2 and 10.)

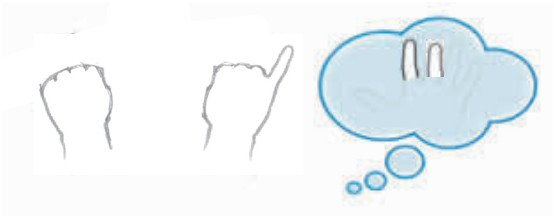
```
12 – 9 = ___
 / \
2   10
```

T: What is the first step to solve?
S: Take from 10.
T: Give me the number sentence to take from ten.
S: 10 – 9 = 1.
T: (Write 10 – 9 = 1.) What is the next step?
S: Add the parts that are left.
T: Give me the number sentence.
S: 1 + 2 = 3.

```
10 – 9 = 1
1 + 2 = 3
```

T: (Write 1 + 2 = 3.)
T: We can do this another way! Show me 12 fingers.
S: We only have 10.
T: Put 2 pretend fingers in your mind.
S: Okay!
T: Let's subtract 12 – 9.
T: Take 9 from your real fingers all at once.
S: (Put down 9 fingers.)
T: How many fingers are left?
S: 1 finger.
T: You forgot about your pretend fingers! We are solving 12 – 9, not 10 – 9.
S: Oops! 3 fingers.
T: So, what is 12 – 9? Say the complete number sentence.
S: 12 – 9 = 3.

10 fingers…….. 2 pretend fingers



1 finger…….. 2 pretend fingers

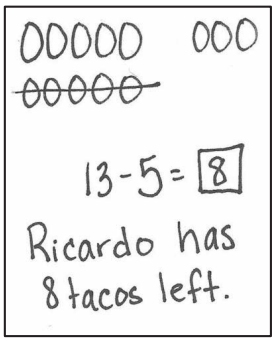
Repeat the process using the following suggested sequence: 12 – 8, 11 – 5, 13 – 6, and 11 – 7. Using personal white boards, students record solutions with number bonds. Allow them to use pretend fingers, if needed.

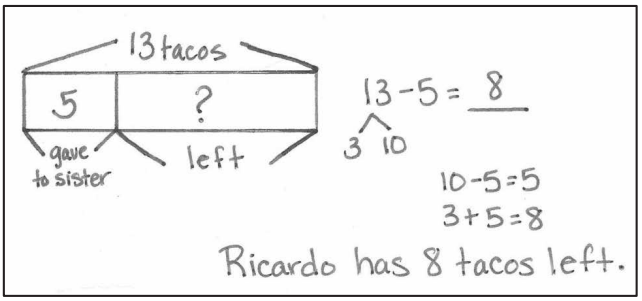
NOTES ON MULTIPLE MEANS OF REPRESENTATION:

Students working below grade level might use ten-sticks of linking cubes or drawings of 5-groups to assist in understanding the take from ten strategy. To bridge back to solving numerically, encourage students to visualize to avoid overdependence on the models.

Application Problem (15 minutes)

Ricardo gave 5 tacos to his sister. He started with 13. How many tacos does Ricardo have left?

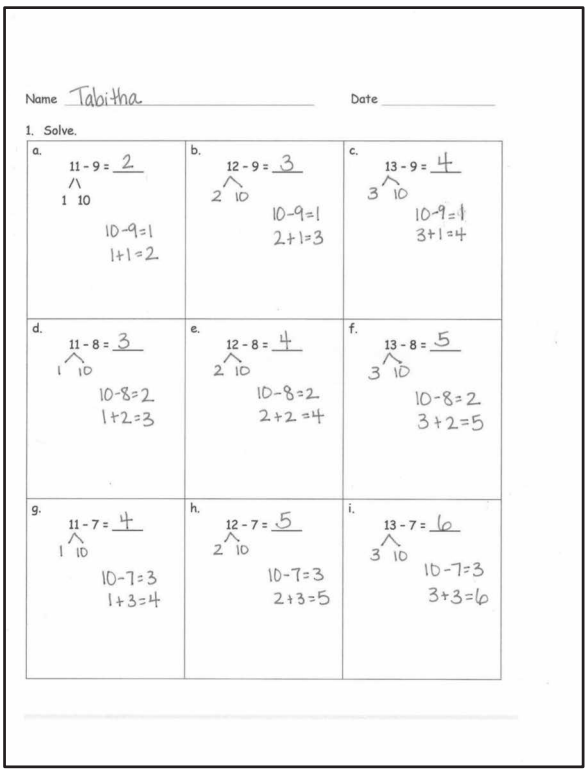




Note: This *take from change unknown* problem provides practice in recognizing that the missing part can be found by subtracting or adding on. To solve this prolem, a flexible understanding of the relationship of addition to subtraction and parts to totals is also necessary. The allotted time period of 15 minutes includes 5 minutes to solve the Application Problem and 10 minutes to complete the Problem Set.

Problem Set (10 minutes)

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. For some classes, it may be appropriate to modify the assignment by specifying which problems they work on first. Some problems do not specify a method for solving. Students should solve these problems using the RDW approach used for Application Problems.



Student Debrief (10 minutes)

Lesson Objective: Take from ten within 20.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

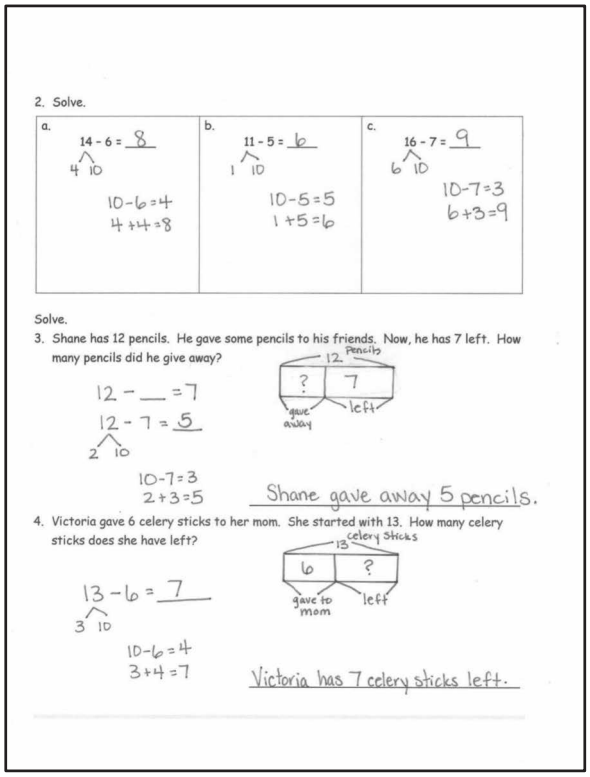
Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson.

Any combination of the questions below may be used to lead the discussion.

- Look at Problem 1. What patterns do you see?
- Look at Problem 2(a). How does knowing your partners of 10 help you solve both 14 – 8 and 14 + 8?
- What do you have to know to be able to use the take from ten strategy?
- What do you think the math goal of this lesson was? What would be a good name for this lesson?

Exit Ticket (3 minutes)

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help with assessing students' understanding of the concepts that were presented in today's lesson and planning more effectively for future lessons. The questions may be read aloud to the students. Note: Each student needs 3 small paper clips for homework.



2. Solve.

a. 14 - 6 = 8 (4, 10) 10-6=4 4+4=8

b. 11 - 5 = 6 (1, 10) 10-5=5 1+5=6

c. 16 - 7 = 9 (6, 10) 10-7=3 6+3=9

Solve.

3. Shane has 12 pencils. He gave some pencils to his friends. Now, he has 7 left. How many pencils did he give away?

12 - ___ = 7

12 - 7 = 5 (2, 10)

10-7=3 2+3=5

Pencils: 12; ?; 7; gave away; left

Shane gave away 5 pencils.

4. Victoria gave 6 celery sticks to her mom. She started with 13. How many celery sticks does she have left?

13 - 6 = 7 (3, 10)

10-6=4 3+4=7

Celery Sticks: 13; 6; ?; gave to mom; left

Victoria has 7 celery sticks left.

Name _____ Date _____

1. Solve.

a. 11 – 9 = ____ /\ 1 10	b. 12 – 9 = ____	c. 13 – 9 = ____
d. 11 – 8 = ____	e. 12 – 8 = ____	f. 13 – 8 = ____
g. 11 – 7 = ____	h. 12 – 7 = ____	i. 13 – 7 = ____

2. Solve.

a.	b.	c.
14 – 6 = ____	11 – 5 = ____	16 – 7 = ____

Solve.

3. Shane has 12 pencils. He gives some pencils to his friends. Now, he has 7 left. How many pencils did he give away?

4. Victoria gave 6 celery sticks to her mom. She started with 13. How many celery sticks does she have left?

Name _____ Date _____

Solve.

1.	2.
15 – 7 = _____	14 – 6 = _____

Name _____ Date _____

1. Take out ten.

17 / \ 7 10	14	18
13	16	19

2. Solve.

10 – 2 = _____	10 – 7 = _____	10 – 6 = _____
10 – 5 = _____	10 – 8 = _____	10 – 9 = _____

3. Solve.

a. 14 – 9 = _____ /\ 4 10 10 – 9 = 1 1 + 4 = _____	b. 15 – 8 = _____
c. 13 – 7 = _____	d. 12 – 8 = _____

Solve.

4. Robert has 16 cups. Some are red. Nine are blue. How many cups are red?

_____ cups are red.

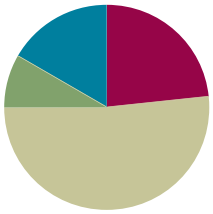
5. Lucy spent $8 on a game. She started with $14. How much money does Lucy have left?

Lesson 8

Objective: Take from 10 within 100.

Suggested Lesson Structure

Fluency Practice	(12 minutes)
Concept Development	(23 minutes)
Application Problem	(15 minutes)
Student Debrief	(10 minutes)
Total Time	**(60 minutes)**



NOTES ON MULTIPLE MEANS OF ENGAGEMENT:

Roll and Follow the Rule (5 minutes)

Materials: (S) 1 die per student or pair

Directions:

Give students a base number (e.g., 17).

Students roll the die to find the part to subtract from the base number (e.g., if 4 is rolled, solve 17 – 4).

For 1 minute, students roll, subtract, and write the subtraction sentence starting with the base number. When time is called, they count the total number of sentences completed.

Continue the process with a different base number (e.g., 15, 13, and 11).

Note: Starting with a base number of 17 means there are always more ones than the number of ones that could be rolled on the die. As the base number decreases, students begin to decide whether to take from the ten or from the ones.

Fluency Practice (12 minutes)

- Take from a Ten or Take from the Ones (2 minutes)
- Take Out Ten and Subtract (10 minutes)

Take from a Ten or Take from the Ones (2 minutes)

Note: This fluency activity draws attention to the fact that when there are not enough ones to subtract, students must take from a ten.

T: This time, tell me if I take from a ten or take from the ones. When I say 13 – 2, you say "take from the ones" since 3 ones – 2 ones = 1 one.

T: But if I say 13 – 9, you say "take from a ten" since 3 ones – 9 ones is work for Grade 6 not Grade 2. Ready?

T: 24 – 1.

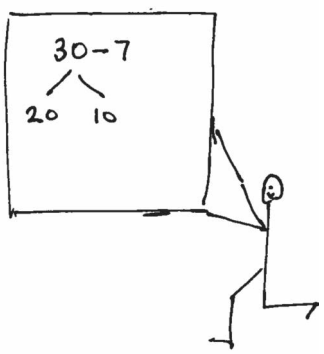
S: Take from the ones.

T: 24 – 9.

S: Take from a ten.

Continue with the following suggested sequence: 16 – 2, 32 – 1, 21 – 9, 15 – 6, 16 – 6, 18 – 8, 13 – 8.

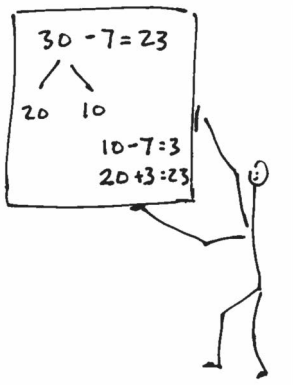
Take Out Ten and Subtract (10 minutes)



Materials: (S) Personal white board

Note: Taking out ten reviews subtracting a single-digit from a two-digit multiple of ten ones.

T: Write 30 – 7 on your boards.
T: Let's take out 10 from 30 using a number bond. Show the ten on the right.
T: Show me your board.
S: (Show number bond.)
T: Read the parts from left to right.
S: 20 and 10.
T: 10 – 7 is …?
S: 3.
T: 20 + 3 is …?
S: 23.
T: So, 30 – 7 is …?
S: 23.



Continue with the following possible sequence: 40 – 7, 50 – 5, 70 – 5, 80 – 8, 90 – 8.

Concept Development (23 minutes)

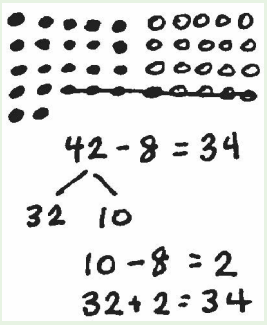
Materials: (S) Personal white board, 25 cm of string

Note: In this lesson, students continue working with the take from ten strategy at the abstract level, using number bonds without the support of pretend fingers.

T: (Project and read aloud.) Jacob has 13 bouncy balls. He gives 8 of them to his friend Pete. How many bouncy balls does Jacob have left?
T: Take a moment to solve. (Pause.) Talk with your partner. What number sentence could you use to solve?
S: 8 + 5 = 13. → 13 – 8 = 5.
T: What strategy did you use to solve.
S: I counted on from 8. → I used pretend fingers. → I used a number bond and take from ten.
T: If you didn't already, work with your partner to solve using the take from ten strategy. Record your work on your personal white board.

NOTES ON MULTIPLE MEANS OF ENGAGEMENT:

As in Lesson 7, students may draw or use concrete materials to solve. Take from ten is readily demonstrated on the Rekenrek or with 5-group rows as pictured below. By alternating between using materials and visualizing, students may come to trust their thinking and find they can both understand and solve numerically.



T: (Show correct student work.) Explain how you used the take from ten strategy to solve.

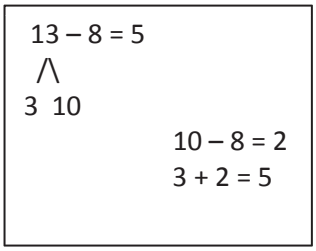
S: I used a number bond to break 13 into 3 and 10. Then I wrote 10 – 8 = 2, and 2 + 3 = 5, so 13 – 8 = 5.

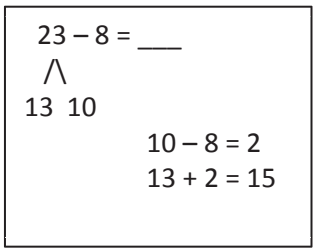
T: Let's return to our story. What does this 5 mean in our story of Jacob and Pete?

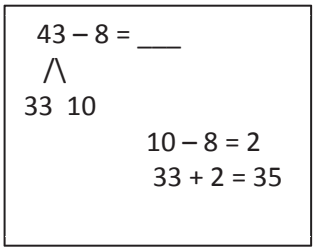
S: Jacob has 5 bouncy balls left!

T: Let's pretend Jacob has 23 bouncy balls and shares 8 with Pete. Work with your partner to see how many balls Jacob has left. Record your work on your personal white board.

T: How did you solve?







S: I used a number bond to break 23 into 13 and 10. Then I wrote 10 – 8 = 2, and 13 + 2 = 15, so 23 – 8 = 15.

T: Now solve 43 – 8. Work with your partner to solve using the take from ten strategy. Record your work on your personal white board.

Continue with the following sequence: 15 – 7, 25 – 7, 55 – 7 and 14 – 9, 24 – 9, 64 – 9.

T: Turn and talk to your partner. What patterns did you notice when solving these problems?

S: I always took out the ten from the total and subtracted. → Every time I subtracted 8 from ten I got 2 ones. → I could make an easier problem with the parts that were left, like 33 + 2 = 35.

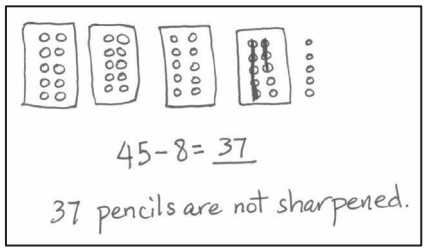
T: Is taking from ten and adding the parts that are left a pattern? Talk to your partner.

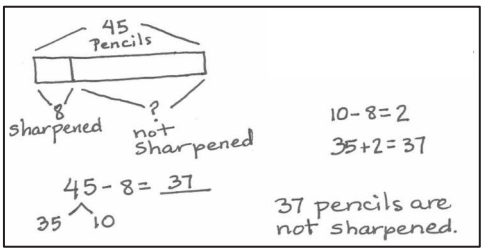
S: No, because a pattern is something you have to see. → Yes! I remember we found patterns when we were learning our addition facts in first grade. → And when we make ten, that is a pattern, too. We just do the same thing over and over again!

T: Yes, a pattern can be something you see, but it's also something we do again and again. We have a pattern here of taking from ten and adding the parts that are left to make an easier problem!

Application Problem (15 minutes)

Emma has 45 pencils. Eight pencils are sharpened. How many pencils are not sharpened?

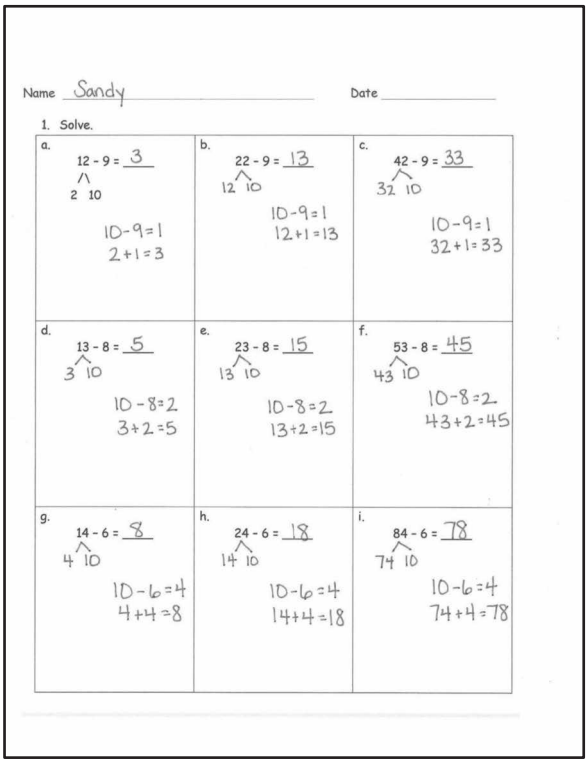




Note: This *take apart addend unknown* problem provides practice decomposing to subtract from a ten. The allotted time period includes 5 minutes to solve the Application Problem and 10 minutes to complete the Problem Set.

Problem Set (10 minutes)

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. For some classes, it may be appropriate to modify the assignment by specifying which problems they work on first. Some problems do not specify a method for solving. Students should solve these problems using the RDW approach used for Application Problems.



Student Debrief (10 minutes)

Lesson Objective: Take from 10 within 100.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

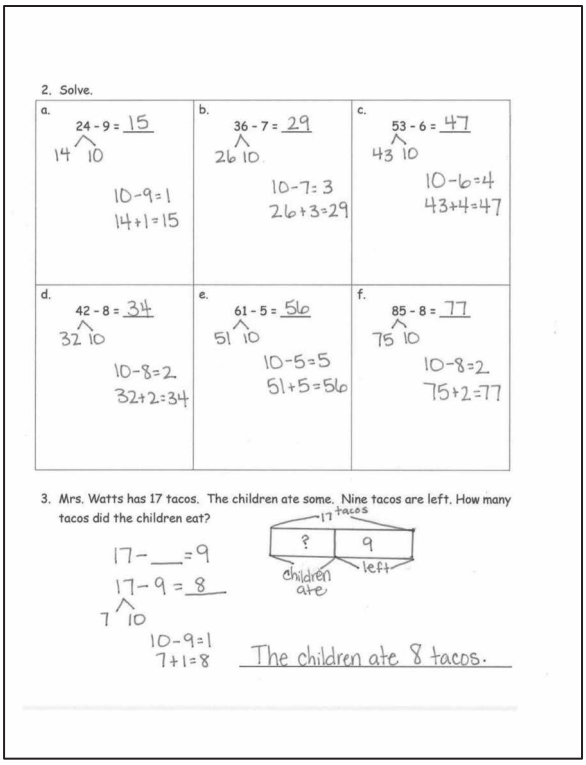
Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson.

Any combination of the questions below may be used to lead the discussion.

- Look at Problem 1. What patterns do you see? What did you do to solve?
- How did you solve Problem 2?
- What do you think the math goal of this lesson was? What would be a good name for this lesson?

Exit Ticket (3 minutes)

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help with assessing students' understanding of the concepts that were presented in today's lesson and planning more effectively for future lessons. The questions may be read aloud to the students.



2. Solve.

a. 24 - 9 = 15 (14 ^ 10) 10-9=1 14+1=15

b. 36 - 7 = 29 (26 ^ 10) 10-7=3 26+3=29

c. 53 - 6 = 47 (43 ^ 10) 10-6=4 43+4=47

d. 42 - 8 = 34 (32 ^ 10) 10-8=2 32+2=34

e. 61 - 5 = 56 (51 ^ 10) 10-5=5 51+5=56

f. 85 - 8 = 77 (75 ^ 10) 10-8=2 75+2=77

3. Mrs. Watts has 17 tacos. The children ate some. Nine tacos are left. How many tacos did the children eat?

17 tacos; ? (children ate); 9 (left)

17 - ___ = 9

17 - 9 = 8 (7 ^ 10) 10-9=1 7+1=8

The children ate 8 tacos.

Name _____ Date _____

1. Solve.

a. 12 – 9 = ____ /\ 2 10	b. 22 – 9 = ____	c. 42 – 9 = ____
d. 13 – 8 = ____	e. 23 – 8 = ____	f. 53 – 8 = ____
g. 14 – 6 = ____	h. 24 – 6 = ____	i. 84 – 6 = ____

2. Solve.

a. 24 – 9 = ____	b. 36 – 7 = ____	c. 53 – 6 = ____
d. 42 – 8 = ____	e. 61 – 5 = ____	f. 85 – 8 = ____

3. Mrs. Watts had 17 tacos. The children ate some. Nine tacos were left. How many tacos did the children eat?

_____

Name _____ Date _____

Solve.

1.	2.	3.
21 – 9 = _____	34 – 8 = _____	82 – 7 = _____

Name _____ Date _____

1. Take out ten.

26 / \ 16 10	34	58
85	77	96

2. Solve.

10 – 1 = _____	10 – 5 = _____	10 – 2 = _____
10 – 4 = _____	10 – 7 = _____	10 – 8 = _____

3. Solve.

a. 13 – 7 = _____	b. 15 – 8 = _____
c. 14 – 6 = _____	d. 16 – 9 = _____

e. 42 – 7 = _____	f. 54 – 6 = _____
g. 71 – 5 = _____	h. 92 – 9 = _____

4. Emma has 16 markers. She gave Jack some. Seven markers are left. How many markers did Emma give Jack?

_____

Name _____ Date _____

1. Solve.

a. 18 + 4 = _____	b. 48 – 6 = _____
c. 15 – 8 = _____	d. 8 + 65 = _____
e. 66 + 30 = _____	f. 83 – 9 = _____

2. Write a number sentence and statement to answer the sticker questions below. Include a math drawing if you like.

   a. Trevor's mom gave him 6 stickers to start his collection. He received 25 more for his birthday. How many stickers does Trevor have now?

   b. James has 40 stickers and gives away 7. How many stickers does James have now?

3. Solve.

a. 13 – 7 = _____	b. 29 + 6 = _____
c. 42 + 5 = ____	d. 36 + 60 = _____
e. 80 – 8 = _____	f. 85 – 60 = _____

4. Tammy gave 7 markers to Sam. She started with 42 markers. How many markers does Tammy have now? Write a number sentence and statement to answer. Include a math drawing if you like.

End-of-Module Assessment Task Standard Addressed	Topics A–B

Represent and solve problems involving addition and subtraction.

- Use addition and subtraction within 100 to solve one-and two-step problems involving situations of adding to, taking from, putting together, taking apart, and comparing with unknowns in all positions, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.

Add and subtract within 20.

- Fluently add and subtract within 20 using mental strategies. By end of Grade 2, know from memory all sums of two one-digit numbers.

Use place value understanding and properties of operations to add and subtract.

- Fluently add and subtract within 100 using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction.

Evaluating Student Learning Outcomes

A Progression Toward Mastery is provided to describe steps that illuminate the gradually increasing understandings that students develop *on their way to proficiency.* In this chart, this progress is presented from left (Step 1) to right (Step 4). The learning goal for students is to achieve Step 4 mastery. These steps are meant to help teachers and students identify and celebrate what the students CAN do now and what they need to work on next.

A Progression Toward Mastery				
Assessment Task Item	**STEP 1 Little evidence of reasoning without a correct answer. (1 Point)**	**STEP 2 Evidence of some reasoning without a correct answer. (2 Points)**	**STEP 3 Evidence of some reasoning with a correct answer or evidence of solid reasoning with an incorrect answer. (3 Points)**	**STEP 4 Evidence of solid reasoning with a correct answer. (4 Points)**
1	Student correctly answers 1–2 problems.	Student correctly answers 3–4 problems.	Student correctly answers 5 problems.	Student correctly answers: a. 22 b. 42 c. 7 d. 73 e. 96 f. 74 The correct answer is evidence of solid reasoning. However, use student work to determine the strategies that students use to solve.
2	Student incorrectly solves and does not include a reasonable number sentence or statement.	Student incorrectly solves but includes both a reasonable number sentence and statement. OR Student correctly solves but is unable to write both a correct statement and number sentence.	For parts (a) and (b), student correctly answers 31 and 33. However, either the number sentence or statement is incorrect or missing.	a. Student correctly answers 31 stickers and writes the number sentence 25 + 6 or 6 + 25 to solve. Student writes a complete statement to answer how many stickers Trevor has now. b. Student correctly answers 33 stickers and writes the number sentence 40 – 7 to solve. Student writes a statement to answer how many stickers James has now.

A Progression Toward Mastery				
3	Student correctly answers 1–2 problems.	Student correctly answers 3–4 problems.	Student correctly answers 5 problems.	Student correctly answers: a. 6 b. 35 c. 47 d. 96 e. 72 f. 25 The correct answer is evidence of solid reasoning. However, use student work to determine the strategies that students use to solve.
4	Student incorrectly solves and does not include a reasonable number sentence or statement.	Student incorrectly solves but includes both a reasonable number sentence and statement. OR Student correctly solves but is unable to write both a correct statement and number sentence.	Student correctly answers 35. However, either the number sentence or statement is incorrect or missing.	Student correctly: a. Answers 35 markers. b. Writes the number sentence 42 – 7 = 35 or 7 + 35 = 42 to solve. c. Writes a complete statement to answer how many markers Tammy has now.

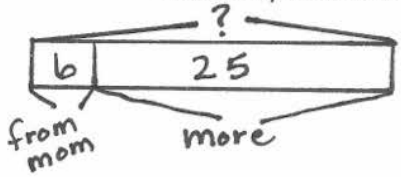
lame Mike Date

. Solve.

a. 18 + 4 = 22 (2, 2) 18+2=20, 20+2=22	b. 48 – 6 = 42
c. 15 – 8 = 7 (5, 10) 10-8=2, 5+2=7	d. 8 + 65 = 73 (3, 5) 65+5=70, 70+3=73
e. 66 + 30 = 96	f. 83 – 9 = 74 (73, 10) 10-9=1, 73+1=74

. Write a number sentence and statement to answer the sticker questions below. Include a math drawing if you like.

a. Trevor's mom gave him 6 stickers to start his collection. He received 25 more for his birthday. How many stickers does Trevor have now?

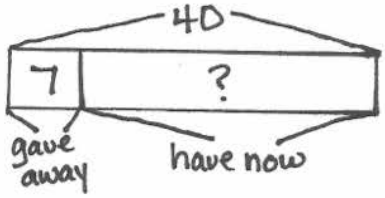


25 + 6 = 31 (5, 1)

Now Trevor has 31 stickers.

25+5=30
30+1=31

b. James has 40 stickers and gives away 7. How many stickers does James have now?



40 - 7 = 33 (30, 10)

Now James has 33 stickers.

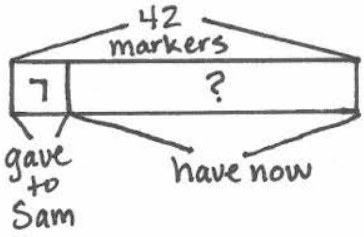
10-7=3
30+3=33

3. Solve.

a. $13 - 7 = \underline{6}$ (3, 10) $10-7=3$ $3+3=6$	b. $29 + 6 = \underline{35}$ (1, 5) $29+1=30$ $30+5=35$
c. $42 + 5 = \underline{47}$	d. $36 + 60 = \underline{96}$
e. $80 - 8 = \underline{72}$ (70, 10) $10-8=2$ $70+2=72$	f. $85 - 60 = \underline{25}$

4. Tammy gave 7 markers to Sam. She started with 42 markers. How many markers does Tammy have now?

Write a number sentence and statement to answer. Include a math drawing if you like.



$42-7=\underline{35}$ (32, 10)

Now Tammy has 35 markers.

$10-7=3$

$32+3=35$

Answer Key

Eureka Math Grade 2 Module 1

Special thanks go to the Gordon A. Cain Center and to the Department of Mathematics at Louisiana State University for their support in the development of *Eureka Math*.

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Published by Great Minds®.

Printed in the U.S.A.
This book may be purchased from the publisher at eureka-math.org.
10 9 8 7 6 5 4 3 2 1

ISBN 978-1-64054-318-8

Answer Key

GRADE 2 • MODULE 1

Sums and Differences to 100

Lesson 1

Sprint

Side A

1.	11	11.	12	21.	15
2.	12	12.	16	22.	18
3.	14	13.	19	23.	19
4.	13	14.	17	24.	16
5.	15	15.	18	25.	17
6.	16	16.	13	26.	10
7.	11	17.	14	27.	10
8.	14	18.	11	28.	7
9.	13	19.	12	29.	9
10.	15	20.	15	30.	10

Side B

1.	15	11.	14	21.	16
2.	14	12.	16	22.	19
3.	13	13.	17	23.	15
4.	12	14.	19	24.	17
5.	11	15.	18	25.	18
6.	15	16.	14	26.	10
7.	14	17.	13	27.	10
8.	12	18.	12	28.	6
9.	11	19.	11	29.	8
10.	13	20.	13	30.	10

Exit Ticket

1. a. 10, 10, 9, 1; 10, 9, 1
   b. 10, 10, 4, 6; 10, 6, 4

2. a. 15
   b. 3
   c. 18

Homework

1. 10, 10, 9, 1
   10, 10, 8, 2; 10, 8, 2
2. 10, 10, 6, 4; number bond drawn
   10, 10, 3, 7; number bond drawn

3. 3, 7, 5, 8
   2, 6, 4, 9

Lesson 2

Sprint

Side A

1.	13	11.	45	21.	69
2.	22	12.	36	22.	89
3.	34	13.	29	23.	6
4.	53	14.	47	24.	7
5.	25	15.	58	25.	70
6.	55	16.	3	26.	80
7.	41	17.	2	27.	80
8.	24	18.	1	28.	7
9.	23	19.	5	29.	5
10.	35	20.	3	30.	90

Side B

1.	12	11.	43	21.	78
2.	23	12.	37	22.	88
3.	34	13.	28	23.	6
4.	54	14.	49	24.	9
5.	45	15.	56	25.	70
6.	51	16.	2	26.	90
7.	51	17.	2	27.	80
8.	24	18.	1	28.	7
9.	22	19.	5	29.	5
10.	35	20.	3	30.	90

Exit Ticket

1. a. 13
   b. 34
   c. 65
   d. 91

2. a. 17
   b. 29
   c. 76
   d. 98

Homework

1. a. 8, 8, 6, 2
   b. 8, 8, 5, 3; number bond drawn
2. 24, 43, 72, 85
   29, 48, 56, 97
3. 4, 3, 1, 2
   10, 20, 70, 80

Number Bond Dash

1.	1	11.	1
2.	2	12.	8
3.	1	13.	2
4.	2	14.	7
5.	0	15.	3
6.	3	16.	4
7.	2	17.	3
8.	3	18.	2
9.	4	19.	7
10.	8	20.	6

Lesson 3

Sprint

Side A

1.	4	11.	23	21.	5
2.	14	12.	53	22.	45
3.	24	13.	2	23.	65
4.	3	14.	12	24.	29
5.	13	15.	22	25.	3
6.	23	16.	8	26.	73
7.	33	17.	58	27.	3
8.	63	18.	9	28.	3
9.	3	19.	69	29.	77
10.	13	20.	89	30.	97

Side B

1.	3	11.	24	21.	2
2.	13	12.	44	22.	42
3.	23	13.	1	23.	72
4.	5	14.	11	24.	37
5.	15	15.	21	25.	4
6.	25	16.	9	26.	74
7.	45	17.	69	27.	3
8.	65	18.	9	28.	3
9.	4	19.	59	29.	79
10.	14	20.	89	30.	99

Problem Set

1. a. 36, 90, 75, 39
   b. 20, 21, 53, 17
2. a. 29
   b. 74
   c. 75
   d. 48
3. a. 48, 48
   b. 25, 15
   c. 96, 96
   d. 35, 45
4. Answers will vary.
5. Lisa is wrong. They both have the same amount of money. Pictures, numbers, and words will vary.

Exit Ticket

1. 28
2. 63
3. 73
4. 16

Homework

1. a. 27, 90, 65, 92
   b. 60, 83, 65, 66
   c. 70, 71, 39, 75
   d. 40, 45, 75, 35
2. a. 49
   b. 94
   c. 47
   d. 78
3. a. 19, 19
   b. 34, 33
   c. 96, 96
   d. 47, 57

Lesson 4

Problem Set

1. 12
2. 14
3. 12
4. 15
5. 12
6. 13
7. 16
8. 17
9. 2, 3
10. 3, 4
11. 4, 6
12. 6, 9
13. 11
14. Ben has 13 pencils altogether.

Exit Ticket

1. 15
2. 13

Homework

1. 12
2. 16
3. 12
4. 14
5. 13
6. 15
7. 16
8. 17
9. Answer provided
   10 + 3 = 13 and 7 + 6 = 13
   10 + 7 = 17 and 9 + 8 = 17
   10 + 5 = 15 and 9 + 6 = 15
   4 + 10 = 14 and 6 + 8 = 14
10. 13

Lesson 5

Problem Set

1. a. 12
   b. 22
   c. 22
   d. 45
   e. 42
   f. 63
   g. 74
   h. 86
2. Shows an alternate way to solve 67 + 5
3. Uses the RDW process to show that Susan collects 84 shells

Exit Ticket

a. 43
b. 65

Homework

1. a. 12
   b. 34
   c. 56
   d. 65
   e. 22
   f. 54
   g. 64
   h. 86
2. a. 72
   b. 93
   c. 65
   d. 85
3. 35 students; RDW approach used

Lesson 6

Problem Set

1. a. 11
   b. 21
   c. 12
   d. 23
   e. 33
   f. 44
   g. 74
   h. 85
   i. 66
   j. 58
2. 81; 80, 10
3. Drawings will vary; 44
4. 64

Exit Ticket

1. 66
2. 57

Homework

1. Answer provided
   30, 10
   40, 10
   60, 10
   50, 10
   70, 10
2. 9
   6
   1
   3
   8
   5
3. a. Answer provided
   b. 21
   c. 32
   d. 42
   e. 53
   f. 63
   g. 74
   h. 85
4. Drawings will vary; 26

Lesson 7

Problem Set

1. a. 2
   b. 3
   c. 4
   d. 3
   e. 4
   f. 5
   g. 4
   h. 5
   i. 6
2. a. 8
   b. 6
   c. 9
3. Shane gave away 5 pencils.
4. Victoria has 7 celery sticks left.

Exit Ticket

1. 8
2. 8

Homework

1. Answer provided
   4, 10
   8, 10
   3, 10
   6, 10
   9, 10
2. 8
   3
   4
   5
   2
   1
3. a. 5; 5
   b. 7
   c. 6
   d. 4
4. 7
5. Lucy has $6 left.

Lesson 8

Problem Set

1. a. 3
   b. 13
   c. 33
   d. 5
   e. 15
   f. 45
   g. 8
   h. 18
   i. 78
2. a. 15
   b. 29
   c. 47
   d. 34
   e. 56
   f. 77
3. The children ate 8 tacos.

Exit Ticket

1. 12
2. 26
3. 75

Homework

1. Answer provided
   24, 10
   48, 10
   75, 10
   67, 10
   86, 10
2. 9
   5
   8
   6
   3
   2
3. a. 6
   b. 7
   c. 8
   d. 7
   e. 35
   f. 48
   g. 66
   h. 83
4. Emma gave Jack 9 markers.

Teacher Edition

Eureka Math Grade 2 Module 2

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10 9 8 7 6 5 4 3 2 1

ISBN 978-1-64054-318-8

G2-M1-M2-UTE-1.3.0-05.2018

Table of Contents

GRADE 2 • MODULE 2

Addition and Subtraction of Length Units

Grade 2 • Module 2

Addition and Subtraction of Length Units

OVERVIEW

In this 12-day Grade 2 module, students engage in activities designed to deepen their conceptual understanding of measurement and to relate addition and subtraction to length. Their work in Module 2 is exclusively with metric units in order to support place value concepts. Customary units are introduced in Module 7.

Topic A opens with students exploring concepts related to the centimeter ruler. In the first lesson, they are guided to connect measurement with physical units as they find the total number of length units by laying multiple copies of centimeter cubes (physical units) end to end along various objects. Through this, students discover that to get an accurate measurement, there must be no gaps or overlaps between consecutive length units.

Next, students measure by iterating with one physical unit, using the *mark and advance* technique, also known as *mark and move forward*. Students then repeat the process by laying both multiple copies and a single cube along a centimeter ruler. This helps students create a mental benchmark for the centimeter. It also helps them realize that the distance between 0 and 1 on the ruler indicates the amount of space already covered. Hence 0, not 1, marks the beginning of the total length. Students use this understanding to create their own centimeter rulers using a centimeter cube and the mark and advance technique. Topic A ends with students using their unit rulers to measure lengths, thereby connecting measurement with a ruler.

Students build skill in measuring using centimeter rulers and meter sticks in Topic B. They learn to see that a length unit is not a cube, or a portion of a ruler (which has width), but is a segment of a line. By measuring a variety of objects, students build a bank of known measurements or benchmark lengths, such as a doorknob being a meter from the floor, or the width of a finger being a centimeter. Then, students learn to estimate length using knowledge of previously measured objects and benchmarks. This enables students to internalize the mental rulers of a centimeter or meter, empowering them to mentally iterate units relevant to measuring a given length. The knowledge and experience signal that students are determining which tool is appropriate to make certain measurements.

In Topic C, students measure and compare to determine how much longer one object is than another. They also measure objects twice using different length units, both standard and non-standard, thereby developing their understanding of how the total measurement relates to the size of the length unit. Repeated experience and explicit comparisons help students recognize that the smaller the length unit, the larger the number of units, and the larger the length unit, the smaller the number of units.

The module culminates as students relate addition and subtraction to length. They apply their conceptual understanding to choose appropriate tools and strategies, such as the ruler as a number line, benchmarks for estimation, and tape diagrams for comparison, to solve word problems. The problems progress from concrete (i.e., measuring objects and using the ruler as a number line to add and subtract) to abstract (e.g., representing lengths with tape diagrams to solve *start unknown* and two-step problems).

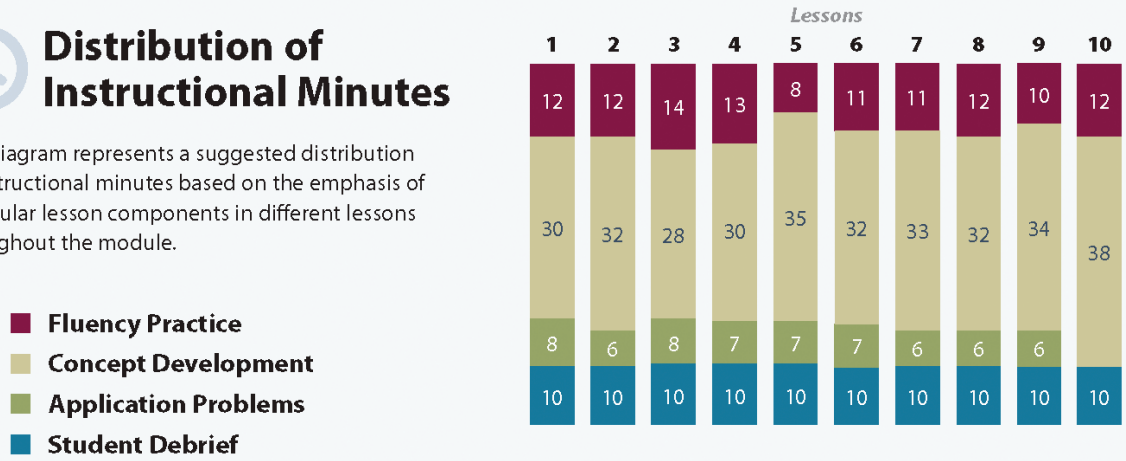
Notes on Pacing for Differentiation

If pacing is a challenge, consider the following modifications and omissions. If students show conceptual understanding of iterated length units in Lesson 1, consider consolidating Lessons 2 and 3. If consolidated, students can apply the "mark and move forward" strategy to making a ruler.

Consider consolidating Lesson 4, which provides practice measuring the lengths of various objects using rulers and meter sticks, with Lesson 5, if a chart of benchmarks is created while measuring. Lesson 8 could be omitted unless students demonstrate a need to use the number line to solve addition and subtraction problems.

Distribution of Instructional Minutes

This diagram represents a suggested distribution of instructional minutes based on the emphasis of particular lesson components in different lessons throughout the module.



Focus Grade Level Standards

Measure and estimate lengths in standard units.[1]

- Measure the length of an object by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes.
- Measure the length of an object twice, using length units of different lengths for the two measurements; describe how the two measurements relate to the size of the unit chosen.

[1]Focus is on metric measurement in preparation for place value in Module 3. Customary measurement is addressed in Module 7.

- Estimate lengths using units of inches, feet, centimeters, and meters.
- Measure to determine how much longer one object is than another, expressing the length difference in terms of a standard length unit.

Relate addition and subtraction to length.

- Use addition and subtraction within 100 to solve word problems involving lengths that are given in the same units, e.g., by using drawings (such as drawings of rulers) and equations with a symbol for the unknown number to represent the problem.
- Represent whole numbers as lengths from 0 on a number line diagram with equally spaced points corresponding to the numbers 0, 1, 2, …, and represent whole-number sums and differences within 100 on a number line diagram.

Foundational Standards

- Order three objects by length; compare the lengths of two objects indirectly by using a third object.
- Express the length of an object as a whole number of length units, by laying multiple copies of a shorter object (the length unit) end to end; understand that the length measurement of an object is the number of same-size length units that span it with no gaps or overlaps. *Limit to contexts where the object being measured is spanned by a whole number of length units with no gaps or overlaps.*

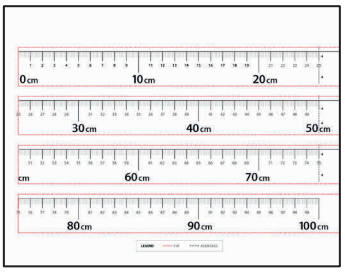
Focus Standards for Mathematical Practice

- **Reason abstractly and quantitatively.** Students reason quantitatively when they measure and compare lengths. They reason abstractly when they use estimation strategies such as benchmarks and mental rulers and when they relate number line diagrams to measurement models.
- **Construct viable arguments and critique the reasoning of others.** Students reason to solve word problems involving length measurement using tape diagrams and analyze the reasonableness of the work of their peers.
- **Use appropriate tools strategically.** Students consider the object being measured and choose the appropriate measurement tool. They use the tape diagram as a tool to solve word problems.
- **Attend to precision.** Students accurately measure by laying physical units end to end with no gaps and by using a measurement tool. They correctly align the zero point on a ruler as the beginning of the total length. They attend to precision when they verbally and in writing specify the length unit, when they use a ruler to measure or draw a straight line of a given length, and when they verify estimates by measuring.

Overview of Module Topics and Lesson Objectives

	Topics and Objectives		Days
A	**Understand Concepts About the Ruler**		3
	Lesson 1:	Connect measurement with physical units by using multiple copies of the same physical unit to measure.	
	Lesson 2:	Use iteration with one physical unit to measure.	
	Lesson 3:	Apply concepts to create unit rulers and measure lengths using unit rulers.	
B	**Measure and Estimate Length Using Different Measurement Tools**		2
	Lesson 4:	Measure various objects using centimeter rulers and meter sticks.	
	Lesson 5:	Develop estimation strategies by applying prior knowledge of length and using mental benchmarks.	
C	**Measure and Compare Lengths Using Different Length Units**		2
	Lesson 6:	Measure and compare lengths using centimeters and meters.	
	Lesson 7:	Measure and compare lengths using standard metric length units and non-standard length units; relate measurement to unit size.	
D	**Relate Addition and Subtraction to Length**		3
	Lesson 8:	Solve addition and subtraction word problems using the ruler as a number line.	
	Lesson 9:	Measure lengths of string using measurement tools, and use tape diagrams to represent and compare the lengths.	
	Lesson 10:	Apply conceptual understanding of measurement by solving two-step word problems.	
	End-of-Module Assessment: Topics A–D (assessment ½ day, return ½ day, remediation or further applications 1 day)		2
	Total Number of Instructional Days		**12**

Terminology



Meter Strip

New or Recently Introduced Terms

- Benchmark (e.g., "round" numbers like multiples of 10)
- Endpoint (point where something begins or ends)
- Estimate (an approximation of a quantity or number)
- Hash mark (marks on a ruler or other measurement tool)
- Meter (standard unit of length in the metric system)
- Meter stick or strip (tool used to measure length)
- Number line
- Overlap (extend over, or cover partly)
- Ruler (tool used to measure length)

Number Line

Familiar Terms and Symbols[2]

- Centimeter (standard length unit within the metric system)
- Combine (join or put together)
- Compare (specifically using direct comparison)
- Difference (to find the difference between two numbers, subtract the smaller number from the greater number)
- Height (vertical distance measurement from bottom to top)
- Length (distance measurement from end to end; in a rectangular shape, length can be used to describe any of the four sides)
- Length unit (e.g., centimeters, inches)

Suggested Tools and Representations

- Centimeter cubes
- Centimeter rulers
- Large and small paper clips
- Meter sticks
- Paper meter strips (Lesson 6 Template)
- Personal white boards
- Tape diagram

[2]These are terms and symbols students have used or seen previously.

Scaffolds[3]

The scaffolds integrated into *A Story of Units* give alternatives for how students access information as well as express and demonstrate their learning. Strategically placed margin notes are provided within each lesson elaborating on the use of specific scaffolds at applicable times. They address many needs presented by English language learners, students with disabilities, students performing above grade level, and students performing below grade level. Many of the suggestions are organized by Universal Design for Learning (UDL) principles and are applicable to more than one population. To read more about the approach to differentiated instruction in *A Story of Units,* please refer to "How to Implement *A Story of Units*."

Assessment Summary

Type	Administered	Format
End-of-Module Assessment Task	After Topic D	Constructed response with rubric

[3]Students with disabilities may require Braille, large print, audio, or special digital files. Please visit greatminds.org/contact to request information on how to obtain student materials that satisfy the National Instructional Materials Accessibility Standard (NIMAS) format.

Topic A

Understand Concepts About the Ruler

Focus Standard:	■	Measure the length of an object by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes.	
Instructional Days:	3		
Coherence	**-Links from:**	G1–M3	Ordering and Comparing Length Measurements as Numbers
	-Links to:	G3–M4	Multiplication and Area

Topic A begins with an exploration of concepts about the ruler. In Lesson 1, students relate length to physical units by measuring various objects with multiple centimeter cubes, creating a mental benchmark for the centimeter. In Lesson 2, they apply their knowledge of using centimeter cubes to measure by moving from repeated physical units to the iteration of one physical unit. This enables them to internalize their understanding of a length unit as the amount of space between one end of the cube and the other (or space between hash marks). Thus, they begin moving from the concrete to the conceptual. Finally, in Lesson 3, students apply knowledge of known measurements to create unit rulers using one centimeter cube. This deepens the understanding of distance on a ruler and the ruler as a number line.

A Teaching Sequence Toward Mastery of Understanding Concepts About the Ruler

Objective 1: **Connect measurement with physical units by using multiple copies of the same physical unit to measure.**
(Lesson 1)

Objective 2: **Use iteration with one physical unit to measure.**
(Lesson 2)

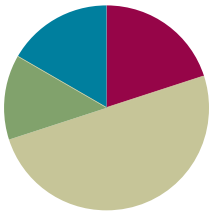
Objective 3: **Apply concepts to create unit rulers and measure lengths using unit rulers.**
(Lesson 3)

Lesson 1

Objective: Connect measurement with physical units by using multiple copies of the same physical unit to measure.

Suggested Lesson Structure

Fluency Practice	(12 minutes)
Application Problem	(8 minutes)
Concept Development	(30 minutes)
Student Debrief	(10 minutes)
Total Time	**(60 minutes)**



Fluency Practice (12 minutes)

- Happy Counting 20–40 (2 minutes)
- Two More (1 minute)
- Sprint: Before, Between, After (9 minutes)

Happy Counting 20–40 (2 minutes)

Note: Counting helps students prepare for counting centimeter cubes in the lesson.

T: Let's count by ones starting at 20. Ready? (Rhythmically point up until a change is desired. Show a closed hand, and then point down. Continue, mixing it up.)

S: 20, 21, 22, 23. (Switch direction.) 22, 21, 20. (Switch direction.) 21, 22, 23, 24, 25. (Switch direction.) 24, 23, 22, 21, 20. (Switch direction.) 21, 22, 23, 24, 25, 26, 27, 28, 29, 30. (Switch direction.) 29, 28, 27. (Switch direction.) 28, 29, 30, 31, 32. (Switch direction.) 31, 30, 29, 28. (Switch direction.) 29, 30, 31, 32, 33, 34. (Switch direction.) 33, 32, 31, 30, 29. (Switch direction.) 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40.

T: Excellent! Try it for 30 seconds with your partner starting at 28. Partner A, you are the teacher today.

Two More (1 minute)

Note: Students practice adding two more to make a ten, which builds fluency when crossing a ten.

T: For every number I say, you will say the number that is 2 more. If I say 2, you would say 4. Ready? 3.

S: 5.

Continue with the following possible sequence: 6, 8, 9, 18, 38, 58, 78, 79, 19, 29, and 39.

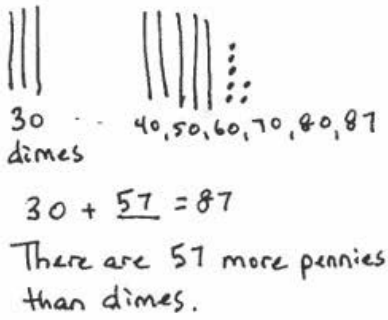
Sprint: Before, Between, After (9 minutes)

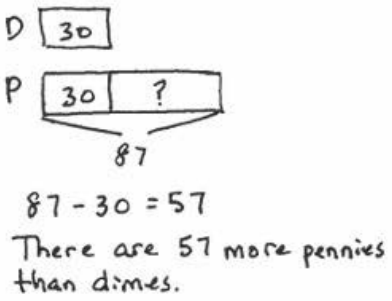
Materials: (S) Before, Between, After Sprint

Note: Students identify the missing number in a pattern to build fluency counting up and back.

Application Problem (8 minutes)

Vincent counts 30 dimes and 87 pennies in a bowl.
How many more pennies than dimes are in the bowl?





NOTES ON MULTIPLE MEANS OF EXPRESSION:

To avoid inhibiting children's natural drawings during the RDW process, be careful not to communicate that the tape diagram is the best or "right" way. If a drawing makes sense, it is right. Regularly guide students through the modeling of a problem with the tape so that this important model gradually enters their tool kit.

Note: This *compare with difference unknown* problem presents an opportunity to work through the common misconception that *more* means add. After drawing the two tapes, ask guiding questions such as, "Does Vincent have more dimes or pennies?" "Does Vincent have 30 pennies?" (Yes!) "Tell me where to draw a line to show 30 pennies." "This part of the tape represents 30 pennies. What does this other part of the pennies tape represent?" (The part that is more than the dimes.) This will help students recognize that they are comparing, not combining, the quantities.

This problem has an interesting complexity because, though there are more of them, the pennies are worth less. Ask students, "Could you buy more with Vincent's pennies or with his dimes? How do you know?"

Concept Development (30 minutes)

Materials: (T) 2–3 crayons of varying lengths, 2 pencil boxes (S) Per pair: small resealable bag with 30 or more centimeter cubes, small resealable bag of used crayons

T: (Call students to sit in a circle on the carpet.) I was looking at my pencil box this morning, and I was very curious about how long it might be. I also have this handful of centimeter cubes, and I thought I might be able to measure the length of my pencil box with these cubes. Does anyone have an idea about how I might do that?

S: You could put the cubes in a line along the pencil box and count how many!

T: Does anyone want to guess, or **estimate**, about how many centimeter cubes long it will be?

S: (Make estimates.)

T: Let's see how many centimeter cubes we can line up along the length of the pencil box. (Place cubes along the length of the first pencil box with random spaces between the cubes.)

T: OK. Should I go ahead and count my cubes now?

S: No!

T: Why not?

S: You need to put the cubes right next to each other. → You need to start measuring at the beginning of the pencil box.

T: You are right! There should be no gaps between the cubes. Also, we need to begin measuring where the object begins. That's called the **endpoint**.

T: Come show me how you would place the cubes to measure this second pencil box. (Student volunteer lays the cubes along the length of the second pencil box starting at the beginning with no spaces between the cubes. Demonstrate in the center of the circle so students can see the alignment.)

NOTES ON MULTIPLE MEANS OF REPRESENTATION:

Post conversation starters during think–pair–share while measuring with cubes:

- Your solution is different from mine because ….
- Your error was ….
- My strategy was to ….

These sentence starters will also be useful in the Student Debrief.

T: Let's count the cubes my way and your way. (Count the cubes chorally with students, and write both measurements on the board.)

T: Turn to your neighbor and tell them why there is a difference between my number of cubes and your number of cubes.

S: You had fewer cubes because there were some empty spaces. → If you push all the cubes together, you have a lot of extra space not measured. → You didn't start at the endpoint.

T: Let's look at a set of used crayons. Each crayon will be a different length, and some may not be an exact measurement.

T: (Hold up a crayon with a measurement that will be rounded up.)

T: Notice that this crayon is almost 8 centimeter cubes long. It is more than 7 and one-half cubes but not quite 8. I can say this crayon is about 8 centimeter cubes long.

T: (Hold up a crayon with a measurement that will be rounded down.)

T: Notice that this crayon is close to 6 centimeter cubes long. It is just a little bit longer than 6 cubes and not halfway to 7 cubes. How long would you say this crayon is?

S: About 6 centimeter cubes.

T: Yes, and we can simply say the crayon is about 6 centimeters.

T: You will now work with a partner to measure a set of used crayons. As you measure, be sure to use the word *about* to describe a measurement that is not exact. Turn to your neighbor and estimate how many centimeter cubes you think you will need for each crayon in the bag. (Alternative items to measure are scissors, each other's pencils, and erasers.)

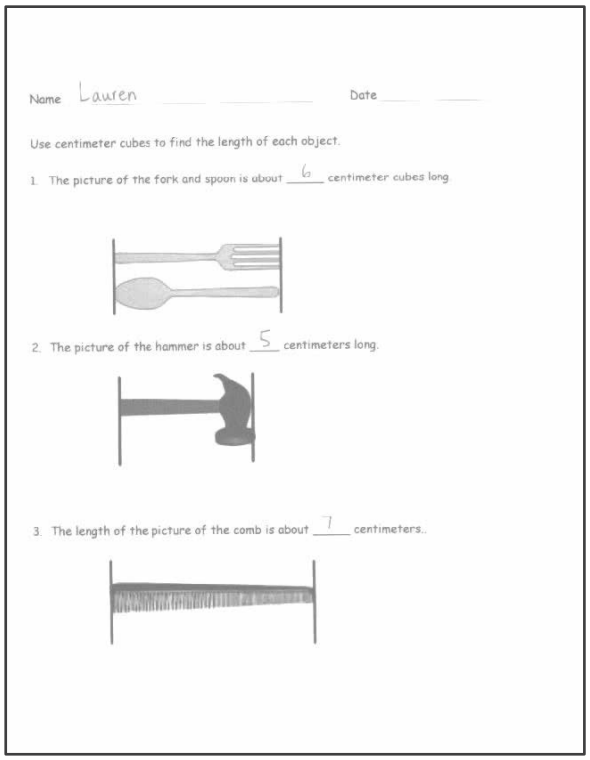
S: (Share estimates with their partner, and then begin measuring their crayons.)

T: Let's practice some more measuring on our Problem Set.

Problem Set (10 minutes)

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. Some problems do not specify a method for solving. This is an intentional reduction of scaffolding. Students should solve these problems using the RDW approach used for Application Problems.

For some classes, it may be appropriate to modify the assignment by specifying which problems students should work on first. With this option, let the purposeful sequencing of the Problem Set guide the selections so that problems continue to be scaffolded. Balance word problems with other problem types to ensure a range of practice. Consider assigning incomplete problems for homework or at another time during the day.


Name Lauren Date

Use centimeter cubes to find the length of each object.

1. The picture of the fork and spoon is about 6 centimeter cubes long.

2. The picture of the hammer is about 5 centimeters long.

3. The length of the picture of the comb is about 7 centimeters.

Student Debrief (10 minutes)

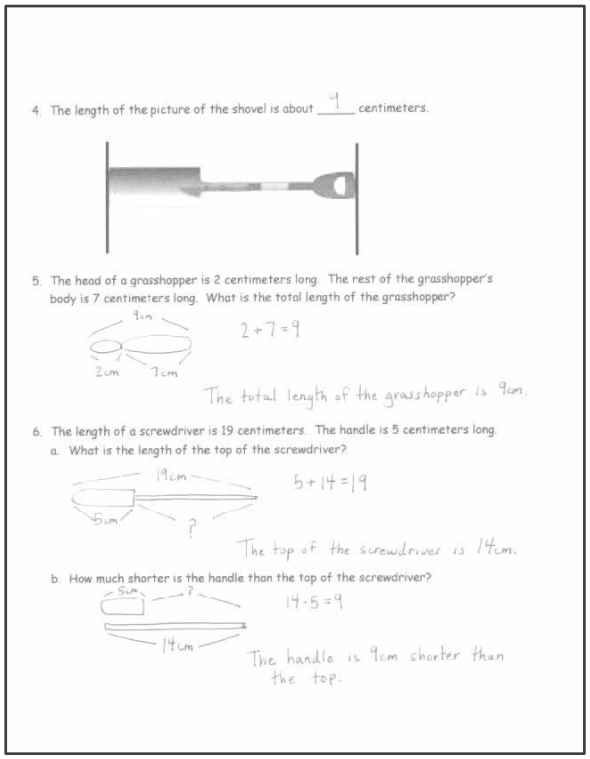
Lesson Objective: Connect measurement with physical units by using multiple copies of the same physical unit to measure.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson.

Any combination of the questions below may be used to lead the discussion.

- Turn to your partner and compare your answers to Problems 1–4. Explain what you had to do to measure correctly.
- Did anyone find, when sharing your work, that you had a different measurement than your partner? (Students will share that they may have not lined up the object with the edge of the first


4. The length of the picture of the shovel is about 9 centimeters.

5. The head of a grasshopper is 2 centimeters long. The rest of the grasshopper's body is 7 centimeters long. What is the total length of the grasshopper?

9cm
2cm 7cm
2+7=9
The total length of the grasshopper is 9cm.

6. The length of a screwdriver is 19 centimeters. The handle is 5 centimeters long.
a. What is the length of the top of the screwdriver?

19cm
5cm ?
5+14=19
The top of the screwdriver is 14cm.

b. How much shorter is the handle than the top of the screwdriver?

5cm ?
14cm
14-5=9
The handle is 9cm shorter than the top.

centimeter cube or that they left spaces between cubes. This is an excellent opportunity to discuss **endpoint**.)

- How did your drawings help you to answer Problems 5 and 6? What new (or significant) vocabulary did we use today to talk about measurement? (Length, **estimate**, and longer.)
- What did you learn about how to measure with centimeter cubes? Could you have measured with a pocketful of coins?

Exit Ticket (3 minutes)

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help you assess the students' understanding of the concepts that were presented in the lesson today and plan more effectively for future lessons. You may read the questions aloud to the students.

Note: Discuss Homework Problems 3 and 4 during the next day's lesson to point out that students should not count the extra cubes.

A

Number Correct: _____

Before, Between, After

1.	1, 2, ___	
2.	11, 12, ___	
3.	21, 22, ___	
4.	71, 72, ___	
5.	3, 4, ___	
6.	3, ___, 5	
7.	13, ___, 15	
8.	23, ___, 25	
9.	83, ___, 85	
10.	7, 8, ___	
11.	7, ___, 9	
12.	___, 8, 9	
13.	___, 18, 19	
14.	___, 28, 29	
15.	___, 58, 59	
16.	12, 13, ___	
17.	45, 46, ___	
18.	12, ___, 14	
19.	36, ___, 38	
20.	___, 19, 20	
21.	___, 89, 90	
22.	98, 99, ___	
23.	99, ___, 101	
24.	19, 20, ___	
25.	119, 120, ___	
26.	35, ___, 37	
27.	135, ___, 137	
28.	___, 24, 25	
29.	___, 124, 125	
30.	142, 143, ___	
31.	138, ___, 140	
32.	___, 149, 150	
33.	148, ___, 150	
34.	___, 149, 150	
35.	___, 163, 164	
36.	187, ___, 189	
37.	___, 170, 171	
38.	178, 179, ___	
39.	192, ___, 194	
40.	___, 190, 191	
41.	197, ___, 199	
42.	168, 169, ___	
43.	199, ___, 201	
44.	___, 160, 161	

B

Number Correct: _____

Improvement: _____

Before, Between, After

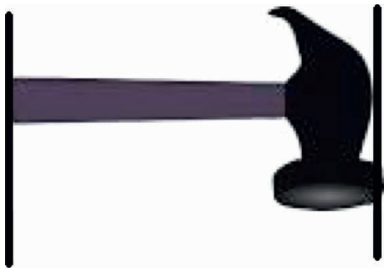
1.	0, 1, ___	
2.	10, 11, ___	
3.	20, 21, ___	
4.	70, 71, ___	
5.	2, 3, ___	
6.	2, ___, 4	
7.	12, ___, 14	
8.	22, ___ 24	
9.	82, ___, 84	
10.	6, 7, ___	
11.	6, ___, 8	
12.	___, 7, 8	
13.	___, 17, 18	
14.	___, 27, 28	
15.	___, 57, 58	
16.	11, 12, ___	
17.	44, 45, ___	
18.	11, ___, 13	
19.	35, ___, 37	
20.	___, 19, 20	
21.	___, 79, 80	
22.	98, 99, ___	
23.	99, ___, 101	
24.	29, 30, ___	
25.	129, 130, ___	
26.	34, ___, 36	
27.	134, ___, 136	
28.	___, 23, 24	
29.	___, 123, 124	
30.	141, 142, ___	
31.	128, ___, 130	
32.	___, 149, 150	
33.	148, ___, 150	
34.	___, 149, 150	
35.	___, 173, 174	
36.	167, ___, 169	
37.	___, 160, 161	
38.	188, 189, ___	
39.	193, ___, 195	
40.	___, 170, 171	
41.	196, ___, 198	
42.	178, 179, ___	
43.	199, ___, 201	
44.	___, 180, 181	

Name _____ Date _____

Use centimeter cubes to find the length of each object.

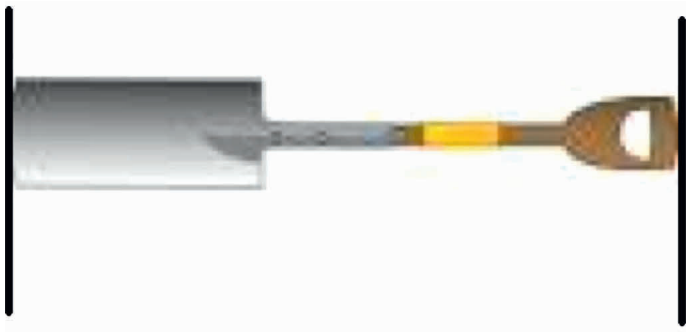
1. The picture of the fork and spoon is about _____ centimeter cubes long.

2. The picture of the hammer is about _____ centimeters long.



3. The length of the picture of the comb is about _____ centimeters.

4. The length of the picture of the shovel is about _____ centimeters.



5. The head of a grasshopper is 2 centimeters long. The rest of the grasshopper's body is 7 centimeters long. What is the total length of the grasshopper?

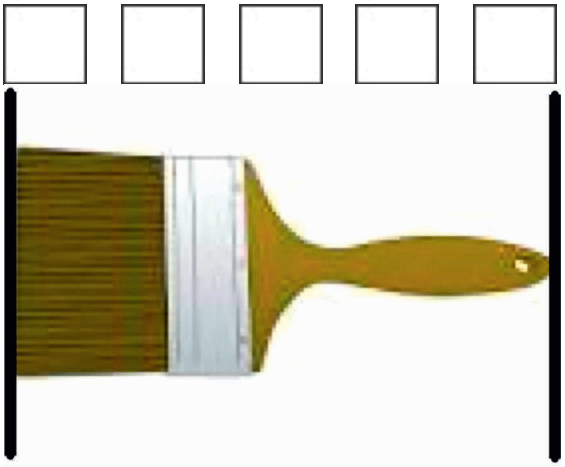
6. The length of a screwdriver is 19 centimeters. The handle is 5 centimeters long.
   a. What is the length of the top of the screwdriver?

   b. How much shorter is the handle than the top of the screwdriver?

Name _____ Date _____

Sara lined up her centimeter cubes to find the length of the picture of the paintbrush.

Sara thinks the picture of the paintbrush is 5 centimeter cubes long.



Is her answer correct? Explain why or why not.

_____

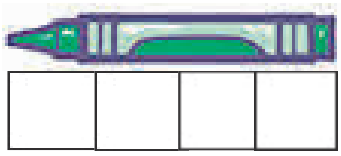
_____

_____

_____

Name _____ Date _____

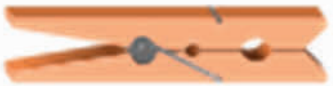
Count each centimeter cube to find the length of each object.

1. 

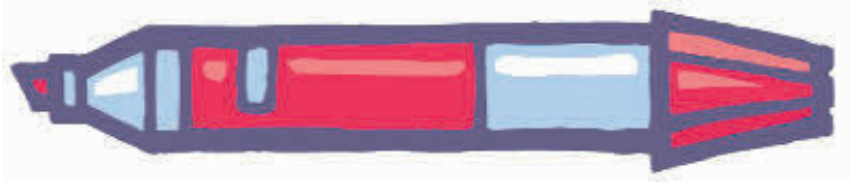
The crayon is _____ centimeter cubes long.

2. 

The pencil is _____ centimeter cubes long.

3. 

The clothespin is _____ centimeter cubes long.

4. 

The length of the marker is _____ centimeter cubes.

5. Richard has 43 centimeter cubes. Henry has 30 centimeter cubes. What is the length of their cubes altogether?

6. The length of Marisa's loaf of bread is 54 centimeters. She cut off and ate 7 centimeters of bread. What is the length of what she has left?

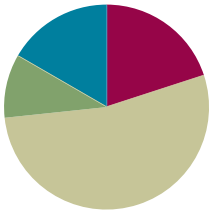
7. The length of Jimmy's math book is 17 centimeter cubes. His reading book is 12 centimeter cubes longer. What is the length of his reading book?

Lesson 2

Objective: Use iteration with one physical unit to measure.

Suggested Lesson Structure

Fluency Practice	(12 minutes)
Application Problem	(6 minutes)
Concept Development	(32 minutes)
Student Debrief	(10 minutes)
Total Time	**(60 minutes)**



Fluency Practice (12 minutes)

- Renaming the Say Ten Way (2 minutes)
- Say Ten to the Next Ten (4 minutes)
- Making the Next Ten to Add (6 minutes)

Renaming the Say Ten Way (2 minutes)

Note: Renaming the Say Ten way reviews skills taught in Module 1 and reinforces using place value concepts to add. Use a Rekenrek to model the first few times to help students with visualization.

T: When I say 52, you say 5 tens 2. Ready? 67.
S: 6 tens 7.
T: 98.
S: 9 tens 8.
T: 100.
S: 10 tens.
T: 113.
S: 11 tens 3.

Continue with the following possible sequence: 103, 123, 127, 137, 132, 142, 143, 163, 168, 188, 198, and 200.

Say Ten to the Next Ten (4 minutes)

Note: This activity helps students see the connection between renaming the Say Ten way and making a ten. It provides practice adding ones to make a multiple of 10.

T: Let's add to make the next ten the Say Ten way. I say 5 tens 2, you say 5 tens 2 + 8 = 6 tens. Ready? 6 tens 7.
S: 6 tens 7 + 3 = 7 tens.
T: 5 tens 1.
S: 5 tens 1 + 9 = 6 tens.
T: 7 tens 8.
S: 7 tens 8 + 2 = 8 tens.

Continue with the following possible sequence: 8 tens 4, 8 tens 5, 8 tens 9, 9 tens 6, 9 tens 3, and 9 tens 9.

Making the Next Ten to Add (6 minutes)

Materials: (S) Personal white board

Note: Students make a unit of ten to add within 20. This foundational fluency is a review of Lesson 3 from Module 1.

T: Let's make 10 to add. If I say 9 + 2, you say 9 + 2 = 10 + 1. Ready? 9 + 3.
S: 9 + 3 = 10 + 2.
T: Answer?
S: 12.
T: 9 + 5.
S: 9 + 5 = 10 + 4.
T: Answer?
S: 14.

Post on board:

9 + 3 = _____
/\
1 2

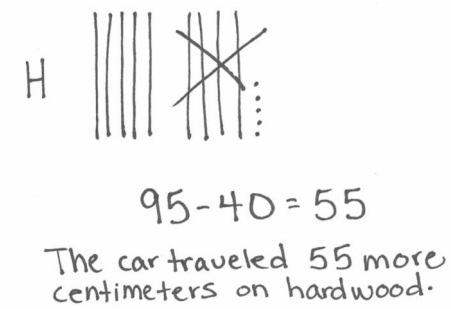
9 + 3 = 10 + 2

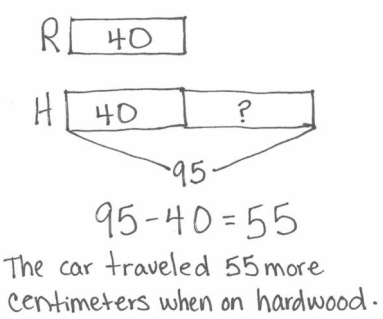
Continue with the following possible sequence: 9 + 7, 9 + 6, 9 + 8, 8 + 3, 8 + 5, 7 + 4, and 7 + 6.

T: On your personal white board, write at least three other similar examples.

Application Problem (6 minutes)

With one push, Brian's toy car traveled 40 centimeters across the rug. When pushed across a hardwood floor, it traveled 95 centimeters. How many more centimeters did the car travel on the hardwood floor than across the rug?





Note: This *compare with difference unknown* problem gives students further practice with comparing quantities. A new complexity is to compare length measurements rather than numbers of discrete objects.

Concept Development (32 minutes)

Materials: (T/S) Small resealable bag with 1 centimeter cube, 1 paper clip, 3 linking cubes (joined), 1 crayon, 1 dry erase marker, 1 sticky note, 1 index card, pencil, paper

T: (Call students to the carpet.) Yesterday, we measured a pencil box together using many centimeter cubes. Today, we will measure some other objects, but this time we will only use one centimeter cube.

T: Think back to the two different ways we measured the pencil boxes yesterday. What mistake did I make?

S: You left spaces between the cubes. → You were supposed to put the cubes right next to each other.

T: Talk with your partner: How could we measure with one cube?

S: You could put the cube down and then put your finger down to show where it ends. → You could mark the end with a pencil.

NOTES ON DIFFERENTIATING THE APPLICATION PROBLEM:

The 9 Application Problems of Module 2 are all comparison situations.

- Lessons 1 and 2: *compare with difference unknown*
- Lessons 3 and 4: *compare with bigger unknown*
- Lessons 5 and 6: *compare with smaller unknown*
- Lesson 7: *compare with smaller unknown* using *more than*
- Lesson 8: *compare with bigger unknown* using *less than*
- Lesson 9: *compare with bigger unknown* using *shorter than*

The challenging situation types in Lessons 7, 8, and 9 might be frustrating if students have not been successful in Lessons 1–6. Consider editing the situations in Lessons 7–9 to instead repeat those of Lessons 1–6, returning to the more challenging problem types in either Module 3 or 4 after students have gained more confidence with the simpler comparison situations.

T: (Model measuring the paper clip with one centimeter cube using the mark and move forward technique. Use a document camera or an overhead projector so students can see. If such technology is unavailable, use a base ten thousands block to measure a line drawn on the board to show students the mark and move forward technique.)

T: Watch my measurement strategy. I make a mark where the cube ends. (Do so.) Then, I move my cube forward so that the mark is right at the beginning of the cube, with no **overlap**. (Do so.) I mark where the cube ends again. Now, talk to your partner about what I'll do next.

S: Move the cube forward so the new mark is at the beginning of the cube!

T: What did you notice about how I measured with my centimeter cube?

S: You didn't leave any space between your pencil mark and the centimeter cube. → Your pencil line is very tiny. → You put the edge of the cube down right on the line.

T: What do you notice about the distance between the pencil marks I've made? Talk with your partner.

S: They're all the same length.

T: When I measured my paper clip, the length was just a little less than 3 centimeters. I can say my paper clip is *about* 3 centimeters because it is very close.

T: Now, it's your turn to measure. Open your bag, and take out the paper clip and the centimeter cube.

T: Put the paper clip on your paper. Now, put your centimeter cube down alongside the paper clip. Make sure your centimeter cube is exactly even with the start of your paper clip. (Walk students through the mark and move forward strategy.)

S: (Measure.)

T: How many centimeters long is the paper clip? Thumbs up when you have your answer.

S: 3 centimeters!

T: Let's measure the crayon this time. Give me a thumbs-up when you know the length of the crayon. (Discuss answer with class.)

NOTES ON MULTIPLE MEANS OF ACTION AND EXPRESSION:

Get moving! Demonstrate the iteration strategy by calling a student forward to measure the classroom board with her body, placing marks on either side of her shoulders and continuing to move forward along the length of the board.

NOTES ON MULTIPLE MEANS OF REPRESENTATION:

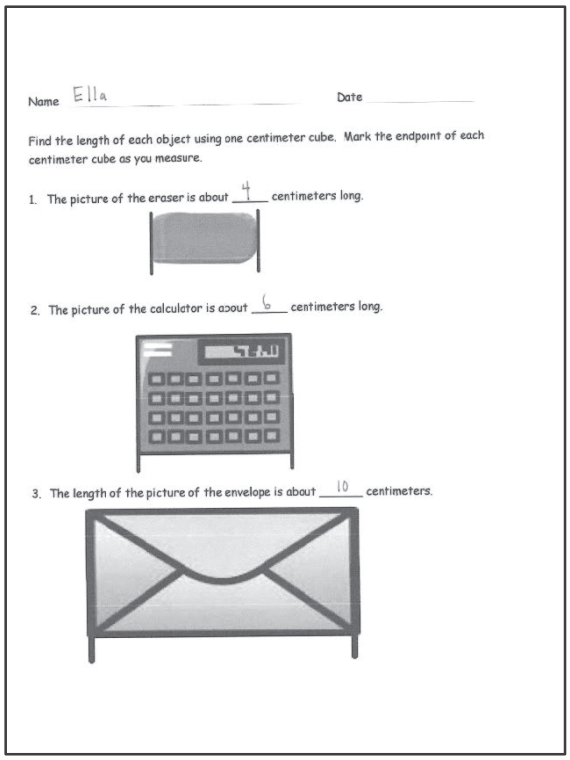
For Problem 5 on the Problem Set, clarify and make connections to important math concepts: repeating equal units and the mark and move forward strategy.

Model written response starters, such as, "Elijah's answer will be incorrect, because …."

Next, have students measure the linking cube stick. Send students to their seats to measure the remaining items in their bags. Keep students who need extra support on the carpet to guide them.

Problem Set (10 minutes)

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. For some classes, it may be appropriate to modify the assignment by specifying which problems they work on first. Some problems do not specify a method for solving. Students should solve these problems using the RDW approach used for Application Problems.



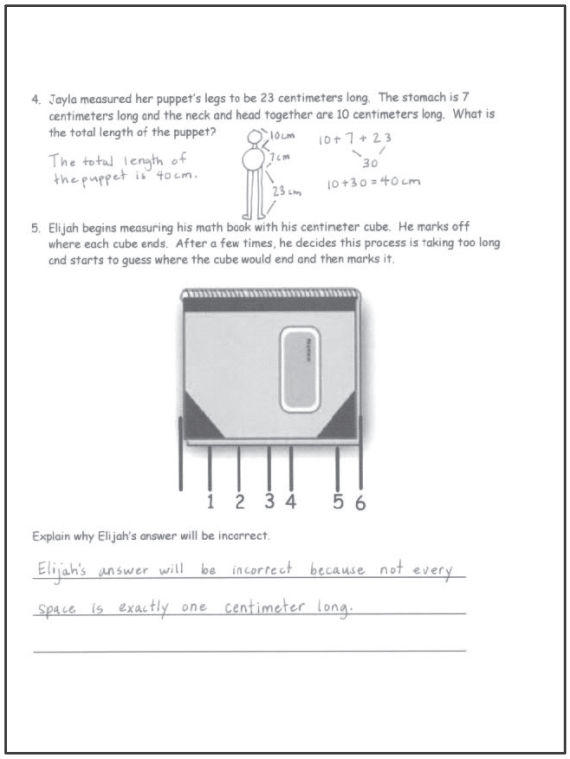
Name Ella Date

Find the length of each object using one centimeter cube. Mark the endpoint of each centimeter cube as you measure.

1. The picture of the eraser is about 4 centimeters long.

2. The picture of the calculator is about 6 centimeters long.

3. The length of the picture of the envelope is about 10 centimeters.



4. Jayla measured her puppet's legs to be 23 centimeters long. The stomach is 7 centimeters long and the neck and head together are 10 centimeters long. What is the total length of the puppet?

10cm 7cm 23cm

10+7+23
30
10+30=40cm

The total length of the puppet is 40cm.

5. Elijah begins measuring his math book with his centimeter cube. He marks off where each cube ends. After a few times, he decides this process is taking too long and starts to guess where the cube would end and then marks it.

1 2 3 4 5 6

Explain why Elijah's answer will be incorrect.

Elijah's answer will be incorrect because not every space is exactly one centimeter long.

Student Debrief (10 minutes)

Lesson Objective: Use iteration with one physical unit to measure.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson.

Any combination of the questions below may be used to lead the discussion.

- Compare your answers to Problems 1–3 with a partner. What did you do to measure accurately?
- What are your thoughts about Elijah's estimation strategy in Problem 5? (Students share answers. Elicit and reinforce the repetition of equal units being necessary to measure.)
- Turn and talk: Why do you think I called today's strategy for measuring the *mark and move forward* strategy? Why is it important not to **overlap**?
- Which method for measuring do you think is better, easier, or quicker—measuring with multiple cubes or measuring with just one cube? Why?
- During our lesson, we measured 3 linking cubes with centimeter cubes. Could we use a linking cube to measure instead of a centimeter cube? Let's measure the picture of Elijah's notebook with one linking cube. What do you notice?

Exit Ticket (3 minutes)

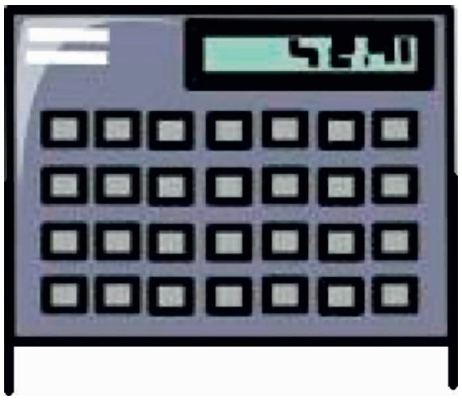
After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help with assessing students' understanding of the concepts that were presented in today's lesson and planning more effectively for future lessons. The questions may be read aloud to the students.

Name _____ Date _____

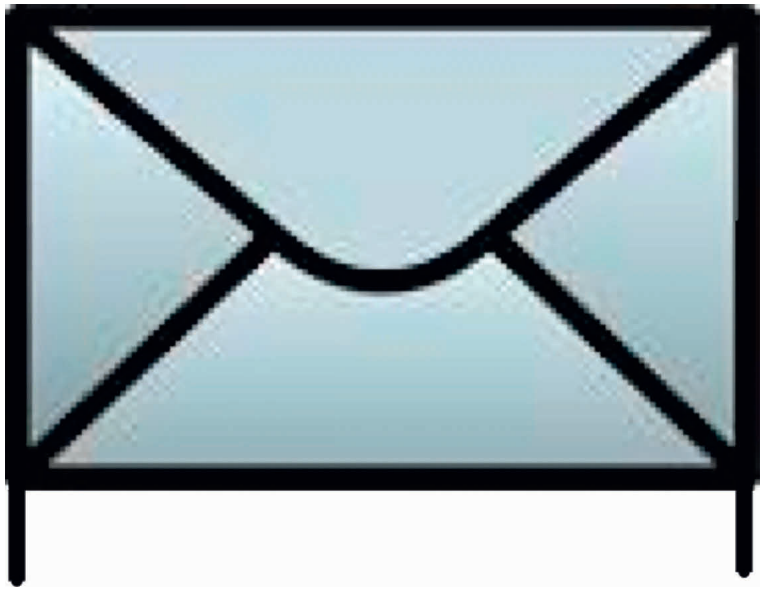
Find the length of each object using one centimeter cube. Mark the endpoint of each centimeter cube as you measure.

1. The picture of the eraser is about _____ centimeters long.

2. The picture of the calculator is about _____ centimeters long.

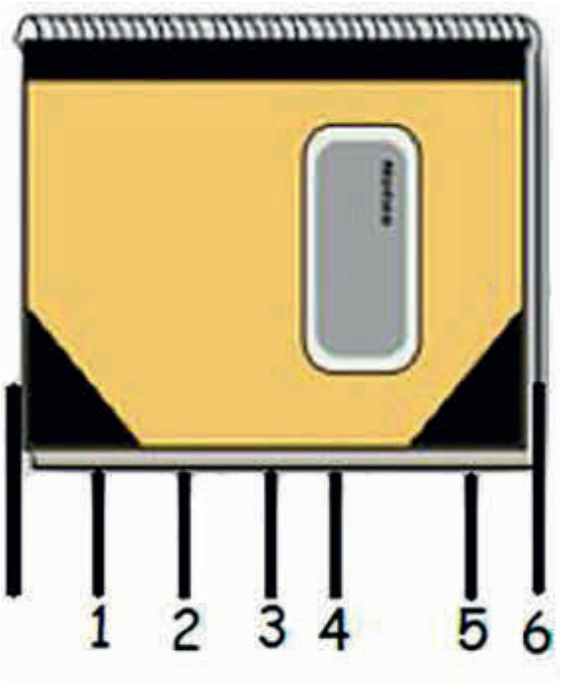


3. The length of the picture of the envelope is about _____ centimeters.



4. Jayla measured her puppet's legs to be 23 centimeters long. The stomach is 7 centimeters long, and the neck and head together are 10 centimeters long. What is the total length of the puppet?

5. Elijah begins measuring his math book with his centimeter cube. He marks off where each cube ends. After a few times, he decides this process is taking too long and starts to guess where the cube would end and then mark it.



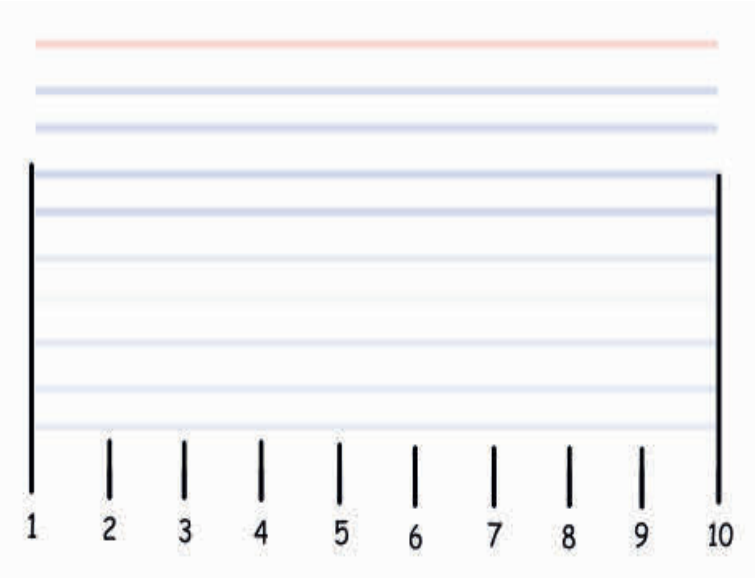
Explain why Elijah's answer will be incorrect.

_____

_____

Name _____ Date _____

Matt measured his index card using a centimeter cube. He marked the endpoint of the cube as he measured. He thinks the index card is 10 centimeters long.



a. Is Matt's work correct? Explain why or why not.

_____

_____

_____

b. If you were Matt's teacher what would you tell him?

_____

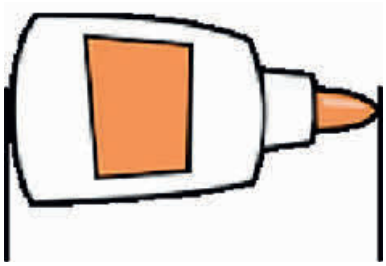
_____

_____

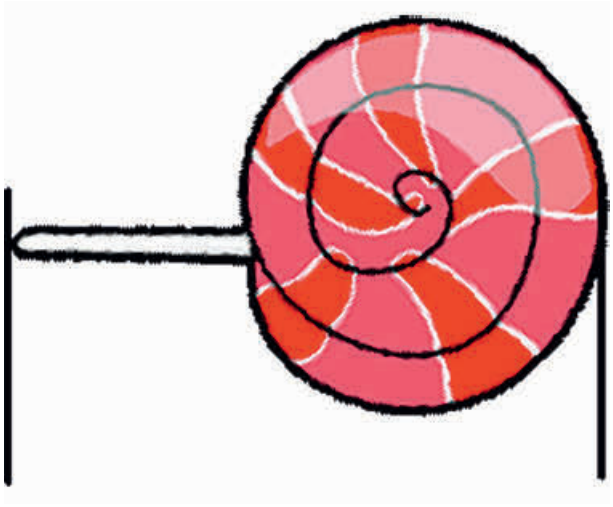
Name _____ Date _____

Use the centimeter square at the bottom of the next page to measure the length of each object. Mark the endpoint of the square as you measure.

1. The picture of the glue is about _____ centimeters long.



2. The picture of the lollipop is about _____ centimeters long.

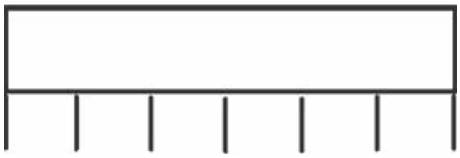


3. The picture of the scissors is about _____ centimeters long.

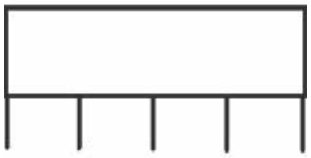
4. Samantha used a centimeter cube and the mark and move forward strategy to measure these ribbons. Use her work to answer the following questions.

Red Ribbon

Blue Ribbon



Yellow Ribbon



a. How long is the red ribbon? _____ centimeters long.

b. How long is the blue ribbon? _____ centimeters long.

c. How long is the yellow ribbon? _____ centimeters long.

d. Which ribbon is the longest? Red Blue Yellow

e. Which ribbon is the shortest? Red Blue Yellow

f. The total length of the ribbons is _____ centimeters.

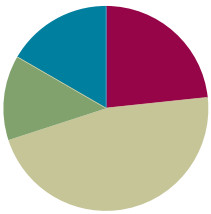
Cut out the centimeter square below to measure the length of the glue bottle, lollipop, and scissors.

Lesson 3

Objective: Apply concepts to create unit rulers and measure lengths using unit rulers.

Suggested Lesson Structure

Fluency Practice	(14 minutes)
Application Problem	(8 minutes)
Concept Development	(28 minutes)
Student Debrief	(10 minutes)
Total Time	**(60 minutes)**



Fluency Practice (14 minutes)

- Happy Counting 40–60 (2 minutes)
- Making Ten by Identifying the Missing Part (3 minutes)
- Sprint: Making Ten (9 minutes)

Happy Counting 40–60 (2 minutes)

Note: Students fluently count by ones with an emphasis on crossing the tens.

T: Let's count by ones starting at 40. Ready? (Rhythmically point up until a change is desired. Show a closed hand, and then point down. Continue, mixing it up.)

S: 40, 41, 42, 43. (Switch direction.) 42, 41, 40. (Switch direction.) 41, 42, 43, 44, 45. (Switch direction.) 44, 43, 42, 41, 40. (Switch direction.) 41, 42, 43, 44, 45, 46, 47, 48, 49, 50. (Switch direction.) 49, 48, 47. (Switch direction.) 48, 49, 50, 51, 52. (Switch direction.) 51, 50, 49, 48. (Switch direction.) 49, 50, 51, 52, 53, 54. (Switch direction.) 53, 52, 51, 50, 49. (Switch direction.) 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60.

T: Excellent! Try it for 30 seconds with your partner starting at 48. Partner B, you are the teacher today.

Make Ten by Identifying the Missing Part (3 minutes)

Materials: (S) Personal white board

Note: Students identify the missing part to make the next ten in preparation for the Sprint.

T: If I say 9, you say 1 because 9 and 1 make 10.

T: Wait for the signal, 5. (Signal with a snap.)

S: 5.

Continue with the following possible sequence: 15, 25, 16, 24, 19, and 21.

T: This time I'll say a number, and you write the addition sentence to make ten on your personal white board.

T: 19. Get ready. Show me your board.

S: (Write 19 + 1 = 20.)

T: Get ready. Show me your board.

Continue with the following possible sequence: 18, 12, 29, 31, 47, and 53.

T: Turn and tell your partner what pattern you noticed that helped you solve the problems.

T: Turn and tell your partner your strategy for finding the missing part.

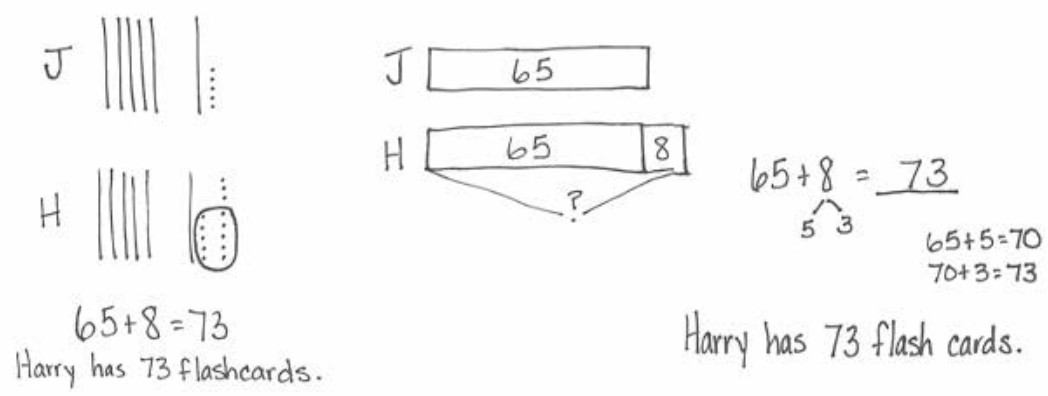
Sprint: Making Ten (9 minutes)

Materials: (S) Making Ten Sprint

Note: Students fluently identify the missing part to make the next ten when adding and subtracting tens and ones.

Application Problem (8 minutes)

Jamie has 65 flash cards. Harry has 8 more cards than Jamie. How many flash cards does Harry have?



Note: This problem type, compare with bigger unknown, challenges students to make sense of the situation and determine the operation to solve. It follows the two previous compare with difference unknown Application Problems to alert students to read and understand the situation instead of relying on key words that tell the operation. This problem exemplifies the error in using more than as a key word to subtract, since in this situation students solve by adding the parts. The problem could be represented using one tape, but since students are just beginning to do comparison problems at this level of sophistication with larger numbers, it may be wise to draw one tape to represent each boy's cards emphasizing the fact of the comparison.

Concept Development (28 minutes)

Materials: (S) 1 30 cm × 5 cm strip of tagboard or sentence strip, 1 centimeter cube, 1 index card or sticky note

Note: In order for students to create an accurate ruler, the hash marks have to be precise. Show students they can make their marks precise by placing the centimeter cube directly below the tagboard and making a line where the cube ends. By doing this, students avoid adding an incremental amount to each length unit.

T: Yesterday, we used 1 centimeter cube to measure the length of different objects. Today, we're going to create a tool that will help us measure centimeters in a more efficient way.

T: Let's make a centimeter **ruler**! Watch how I use my centimeter cube to measure and mark centimeters onto the tagboard.

T: (Model placing the cube and using the mark and move forward strategy to show 4 cm.) What did you notice about how I marked my tagboard?

S: You did what we did yesterday. → You didn't leave any space between the cube and your pencil mark. → You made all the spaces (intervals) the same size. → You called it the mark and move forward strategy.

T: Now, take out your tagboard, centimeter cube, and pencil. Let's do a few centimeters together. (Turn tagboard over, and guide students to make their first 3 cm along with you.)

Support students who need assistance, and allow those who show mastery to complete their rulers independently. As students complete their rulers, direct them to explore measuring items around the room.

After all students have completed their rulers, invite them to the carpet with their rulers, centimeter cubes, index cards, and pencils.

NOTES ON MULTIPLE MEANS OF REPRESENTATION:

Glue a toothpick or piece of wax-covered yarn to represent each of the hash marks for blind or visually impaired students, enabling them to feel the length units on their rulers.

T: You have all completed a centimeter ruler. Now, let's explore how we can use this tool. Take a look at some of the objects students measured around the room. I see that someone measured a math book. Let's take a look at how we might do that.

T: Turn to your neighbor and tell him how you would use your centimeter ruler to measure the length of your math book.

S: You can put the ruler next to the book and count how many lines. → Line up the ruler with the edge of the math book. Count how many lines there are.

T: (Line ruler up with the edge of the math book.) We call these marks on the ruler **hash marks**. Count the hash marks with me.

S: (Count.)

T: I notice there is a lot of room for mistakes here with so much counting. Does anyone have an idea about how I could make this easier the next time I use my ruler?

S: You can label the hash marks with numbers!

T: It is a wise idea to label the hash marks with numbers. I can keep count more easily, and also, next time, I won't have to count again. (Model marking the first two centimeters.)

T: Notice that I am making my numbers small so they fit right on top of the hash marks. Now, it's your turn. (As students show mastery of marking their rulers with numbers, allow them to complete the numbers for all 30 hash marks.)

T: What unit did we use to create our rulers?

S: A centimeter.

T: How many centimeters are on your ruler? Be sure to say the unit.

S: 30 centimeters.

T: (Record 30 centimeters on the board. Write 30 cm next to it.) This is another way we can write centimeters.

T: Let's practice using our rulers together. Take out your index cards. Turn and talk with your partner: Where should I place my ruler to measure the long side of the index card?

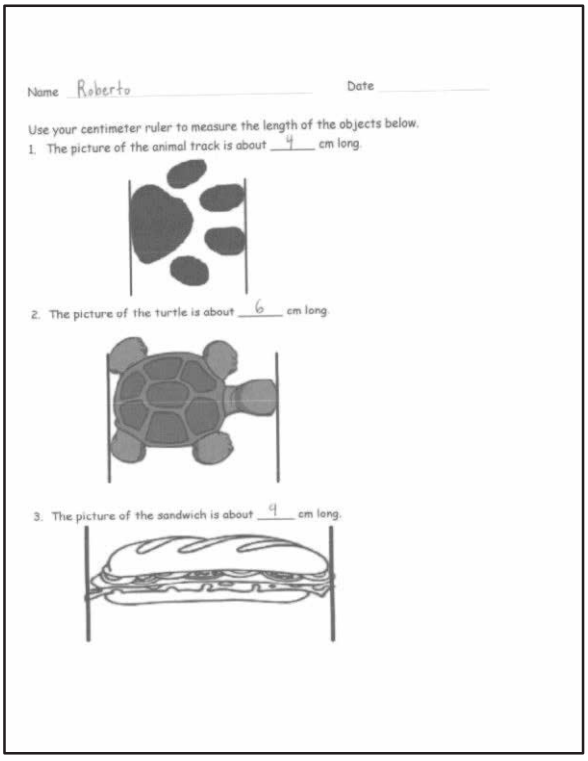
Guide students through measuring an index card and at least two more objects, such as a pencil and a pencil box. Direct students to write their measurements in the abbreviated form for centimeters (cm). As they show mastery, send them to their seats to complete the Problem Set. If students need more practice, provide them with another opportunity, such as measuring a pencil.

NOTES ON MULTIPLE MEANS OF ENGAGEMENT:

Assign students a measurement discovery buddy to clarify directions and processes. Buddies compare answers to check their work.

Problem Set (7 minutes)

Students should do their personal best to complete the Problem Set within the allotted 7 minutes. For some classes, it may be appropriate to modify the assignment by specifying which problems they work on first. Some problems do not specify a method for solving. Students should solve these problems using the RDW approach used for Application Problems.


Name Roberto Date

Use your centimeter ruler to measure the length of the objects below.

1. The picture of the animal track is about 4 cm long.

2. The picture of the turtle is about 6 cm long.

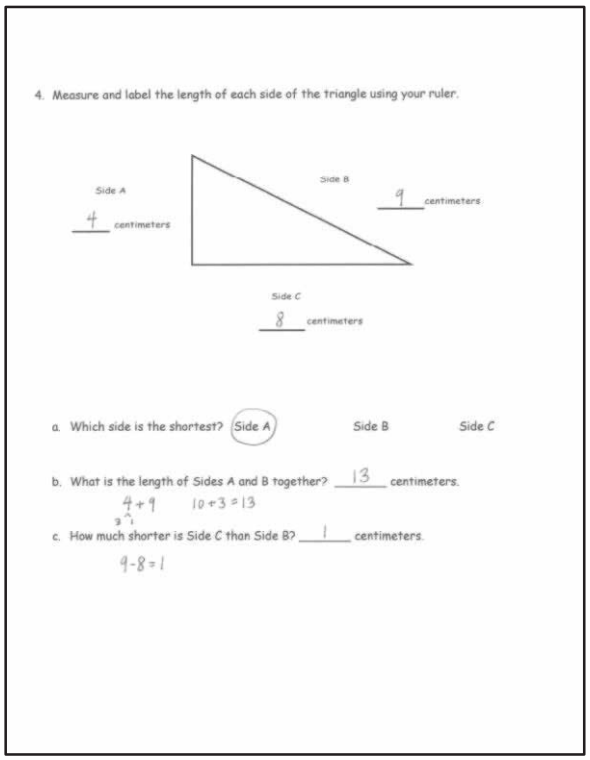
3. The picture of the sandwich is about 9 cm long.

Student Debrief (10 minutes)

Lesson Objective: Apply concepts to create unit rulers and measure lengths using unit rulers.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson.


4. Measure and label the length of each side of the triangle using your ruler.

Side A
4 centimeters

Side B
9 centimeters

Side C
8 centimeters

a. Which side is the shortest? (Side A) Side B Side C

b. What is the length of Sides A and B together? 13 centimeters.
4 + 9 10 + 3 = 13

c. How much shorter is Side C than Side B? 1 centimeters.
9 - 8 = 1

Any combination of the questions below may be used to lead the discussion.

- Turn to your partner and compare your measurements on Problems 1–3. What did you do to measure accurately with your centimeter **ruler**?
- Tell your partner how you made your ruler. What steps did you take to make it an accurate tool for measurement?
- What was different about using the mark and move forward strategy from using the ruler? Why is using the ruler more efficient than counting **hash marks**?
- What are some objects that are longer than our centimeter rulers? How can we measure objects that are longer than our rulers?

Exit Ticket (3 minutes)

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help with assessing students' understanding of the concepts that were presented in today's lesson and planning more effectively for future lessons. The questions may be read aloud to the students.

A

Number Correct: _____

Making Ten

1.	0 + ____ = 10	
2.	9 + ____ = 10	
3.	8 + ____ = 10	
4.	7 + ____ = 10	
5.	6 + ____ = 10	
6.	5 + ____ = 10	
7.	1 + ____ = 10	
8.	2 + ____ = 10	
9.	3 + ____ = 10	
10.	4 + ____ = 10	
11.	10 + ____ = 10	
12.	9 + ____ = 10	
13.	19 + ____ = 20	
14.	5 + ____ = 10	
15.	15 + ____ = 20	
16.	8 + ____ = 10	
17.	18 + ____ = 20	
18.	6 + ____ = 10	
19.	16 + ____ = 20	
20.	7 + ____ = 10	
21.	17 + ____ = 20	
22.	3 + ____ = 10	
23.	13 + ____ = 20	
24.	23 + ____ = 30	
25.	27 + ____ = 30	
26.	5 + ____ = 10	
27.	25 + ____ = 30	
28.	2 + ____ = 10	
29.	22 + ____ = 30	
30.	32 + ____ = 40	
31.	1 + ____ = 10	
32.	11 + ____ = 20	
33.	21 + ____ = 30	
34.	31 + ____ = 40	
35.	38 + ____ = 40	
36.	36 + ____ = 40	
37.	39 + ____ = 40	
38.	35 + ____ = 40	
39.	____ + 6 = 30	
40.	____ + 8 = 20	
41.	____ + 7 = 40	
42.	____ + 6 = 20	
43.	____ + 4 = 30	
44.	____ + 8 = 40	

B

Number Correct: _____

Improvement: _____

Making Ten

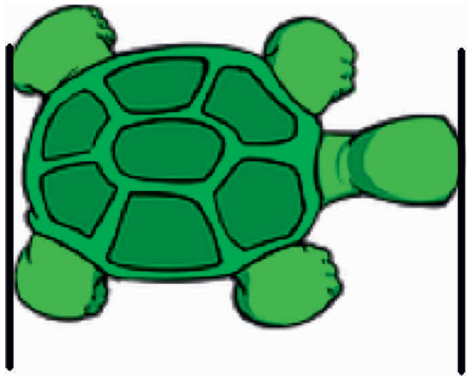
1.	10 + ____ = 10	
2.	9 + ____ = 10	
3.	8 + ____ = 10	
4.	7 + ____ = 10	
5.	6 + ____ = 10	
6.	5 + ____ = 10	
7.	1 + ____ = 10	
8.	2 + ____ = 10	
9.	3 + ____ = 10	
10.	4 + ____ = 10	
11.	0 + ____ = 10	
12.	5 + ____ = 10	
13.	15 + ____ = 20	
14.	9 + ____ = 10	
15.	19 + ____ = 20	
16.	8 + ____ = 10	
17.	18 + ____ = 20	
18.	7 + ____ = 10	
19.	17 + ____ = 20	
20.	6 + ____ = 10	
21.	16 + ____ = 20	
22.	4 + ____ = 10	
23.	14 +____ = 20	
24.	24 + ____ = 30	
25.	26 + ____ = 30	
26.	9 + ____ = 10	
27.	29 + ____ = 30	
28.	3 + ____ = 10	
29.	23 + ____ = 30	
30.	33 + ____ = 40	
31.	2 + ____ = 10	
32.	12 + ____ = 20	
33.	22 + ____ = 30	
34.	32 + ____ = 40	
35.	37 + ____ = 40	
36.	34 + ____ = 40	
37.	35 + ____ = 40	
38.	39 + ____ = 40	
39.	____ + 4 = 30	
40.	____ + 9 = 20	
41.	____ + 4 = 40	
42.	____ + 7 = 20	
43.	____ + 3 = 30	
44.	____ + 9 = 40	

Name _____ Date _____

Use your centimeter ruler to measure the length of the objects below.

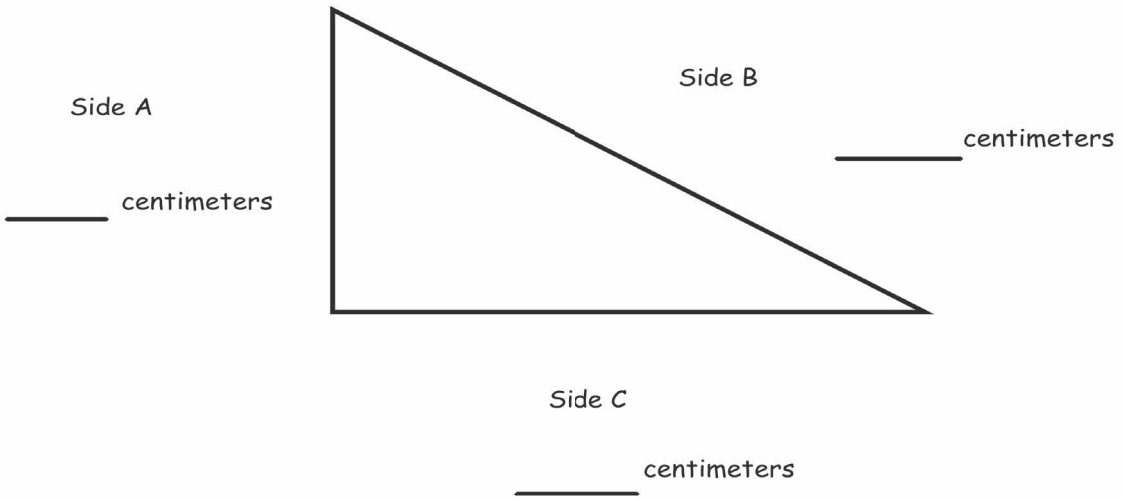
1. The picture of the animal track is about _____ cm long.

2. The picture of the turtle is about _____ cm long.



3. The picture of the sandwich is about _____ cm long.

4. Measure and label the length of each side of the triangle using your ruler.



a. Which side is the shortest? Side A Side B Side C

b. What is the length of Sides A and B together? _____ centimeters

c. How much shorter is Side C than Side B? _____ centimeters

Name _____ Date _____

1. Use your centimeter ruler. What is the length in centimeters of each line?

   a. Line A is _____ cm long.

      Line A _____

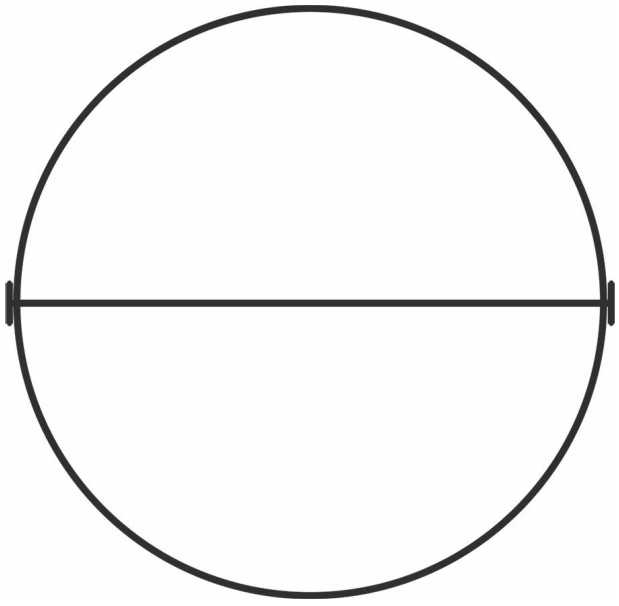
   b. Line B is _____ cm long.

      Line B _____

   c. Line C is _____ cm long.

      Line C _____

2. Find the length across the center of the circle.

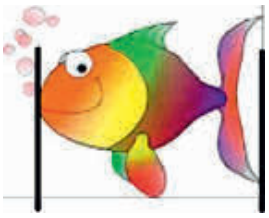


   The length across the circle is _____ cm.

Name _____ Date _____

Measure the lengths of the objects with the centimeter ruler you made in class.

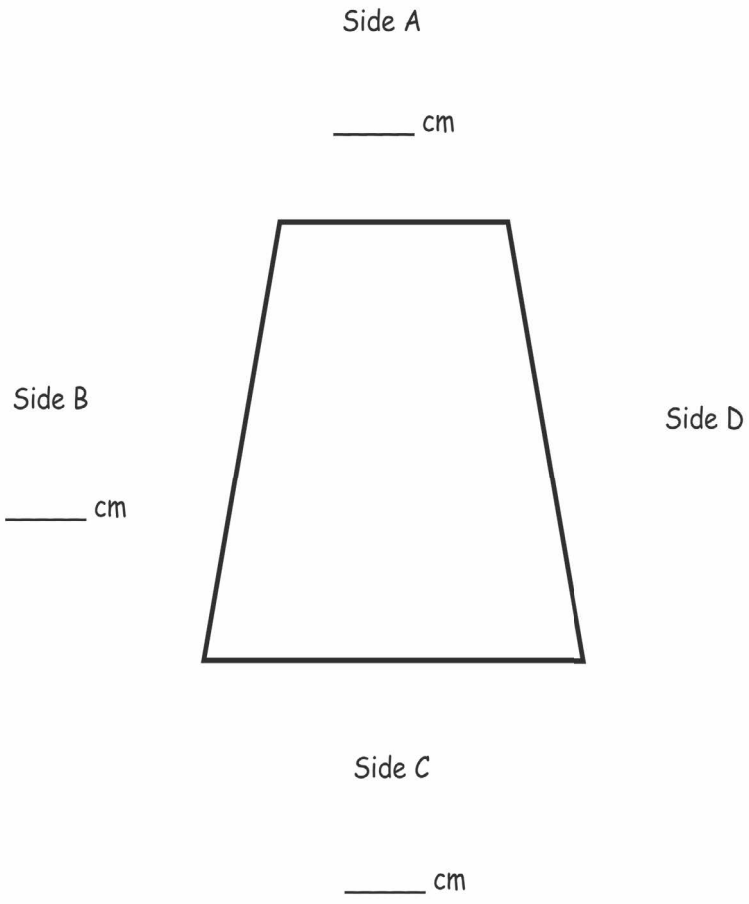
1. The picture of the fish is ____ cm long.



2. The picture of the fish tank is _____ cm long.

3. The picture of the fish tank is _____ cm longer than the picture of the fish.

4. Measure the lengths of Sides A, B, and C. Write each length on the line.



a. Which side is the longest? Side A Side B Side C

b. How much longer is Side B than Side A? _____ cm longer

c. How much shorter is Side A than Side C? _____ cm shorter

d. Sides B and D are the same length.
What is the length of Sides B and D together? _____ cm

e. What is the total length of all four sides of this figure? _____ cm

Topic B

Measure and Estimate Length Using Different Measurement Tools

Focus Standards:	■	Measure the length of an object by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes.	
	■	Estimate lengths using units of inches, feet, centimeters, and meters.	
Instructional Days:	2		
Coherence	**-Links from:**	G1–M3	Ordering and Comparing Length Measurement as Numbers
	-Links to:	G2–M7	Problem Solving with Length, Money, and Data
		G3–M2	Place Value and Problem Solving with Units of Measure

In Lesson 4, students begin to use centimeter rulers, meter sticks, and meter tapes to measure various objects. Through the practice of measuring various items and learning mental benchmarks for measurement, students organically develop estimation skills in Lesson 5. They also develop their skills for selecting an appropriate measuring tool by referencing prior knowledge of objects they have already measured, as well as by using mental benchmarks.

A Teaching Sequence Toward Mastery of Measuring and Estimating Length Using Different Measurement Tools

Objective 1: **Measure various objects using centimeter rulers and meter sticks. (Lesson 4)**

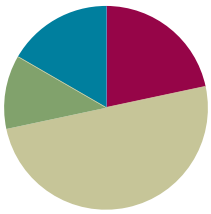
Objective 2: **Develop estimation strategies by applying prior knowledge of length and using mental benchmarks. (Lesson 5)**

Lesson 4

Objective: Measure various objects using centimeter rulers and meter sticks.

Suggested Lesson Structure

Fluency Practice	(13 minutes)
Application Problem	(7 minutes)
Concept Development	(30 minutes)
Student Debrief	(10 minutes)
Total Time	**(60 minutes)**



Fluency Practice (13 minutes)

- Related Facts on a Ruler (4 minutes)
- Sprint: Related Facts (9 minutes)

Related Facts on a Ruler (4 minutes)

Materials: (S) 30 cm ruler created in Lesson 3

Note: This fluency activity utilizes the ruler made in Lesson 3 to fluently review related facts.

T: Put your finger on 3 on the ruler you made yesterday. Raise your hand when you know 8 more than 3. Ready?
S: 11.
T: Give a number sentence starting with 3 that shows 8 more.
S: 3 + 8 = 11.
T: Give a number sentence to show 3 more than 8.
S: 8 + 3 = 11.
T: Put your finger on 11. Raise your hand when you know 3 less than 11.
S: 8.
T: What is the number sentence?
S: 11 – 3 = 8.
T: Give a number sentence to show 8 less than 11.
S: 11 – 8 = 3.

Continue with the following possible sequence: 9, 2, 11; 4, 9, 13; 8, 5, 13; and 9, 6, 15.

NOTES ON MULTIPLE MEANS OF ACTION AND EXPRESSION:

To provide support for the quick pace of one-minute Sprints:

- Consider giving students who do not excel under pressure the chance to practice the Sprint at home the night before it is administered.
- Guide personal goal setting within a time frame (e.g., to finish more problems correctly on the second Sprint). Have students ask, "How did I improve?"
- Allow the class to finish Sprint A after the minute has ended to help prepare for Sprint B.

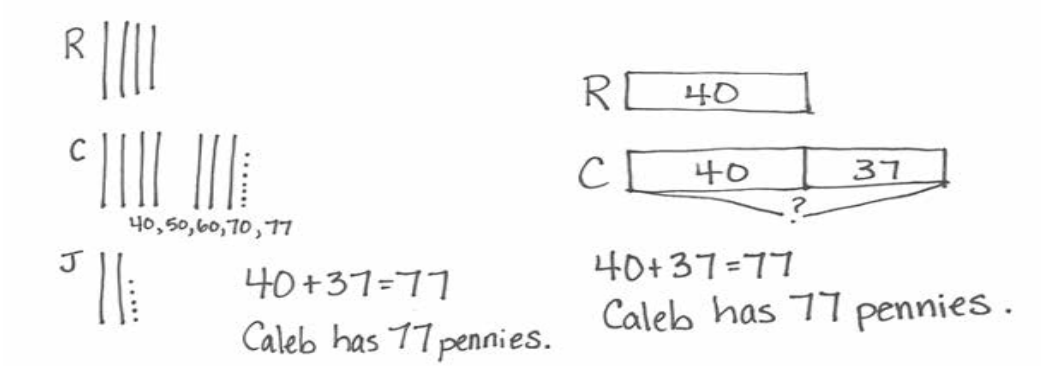
Sprint: Related Facts (9 minutes)

Materials: (S) Related Facts Sprint

Note: The Sprint helps students use related facts as a tool to build mastery of sums and differences within 20.

Application Problem (7 minutes)

Caleb has 37 more pennies than Richard. Richard has 40 pennies. Joe has 25 pennies. How many pennies does Caleb have?



Note: This problem has the added complexity of extraneous information, Joe's pennies. Ask, "Do I need to draw Joe's pennies?" Depending on the needs of students, this can be omitted in order to focus on the *compare with bigger unknown* problem where *more than* is used to compare two quantities, and addition is used to solve.

Concept Development (30 minutes)

Materials: (T) Meter stick, meter tape (S) Centimeter ruler made in Lesson 3, textbook; meter stick, meter tape per pair

T: Let's redecorate the room. I want to measure the carpet to see how long our new one should be.

T: Can someone bring his ruler up from yesterday to measure the carpet?

S: (Measure the carpet with centimeter ruler.)

T: That took a very long time! Maybe we should have used this! (Hold up the meter stick.)

T: Look at these tools I have! (Lay a meter stick and meter tape on the ground.) Can I have two volunteers lay some rulers down on top of the **meter stick** and the meter tape, naming them as you place them, to measure their length in centimeters?

NOTES ON MULTIPLE MEANS OF ENGAGEMENT:

Assign students a measurement discovery buddy to clarify directions and processes. Buddies compare answers to check their work.

T: How many centimeters are in 1 **meter**?
S: It is 100 centimeters. → It's just a little longer than 3 centimeter rulers.
T: This is another measurement unit called a meter. When we are measuring things that are more than 100 centimeters, we can measure in meters.
T: We use a meter stick exactly the same way we use a ruler.
T: (Call on a volunteer to measure the length of the rug with a meter stick.)
T: I notice that the rug is not exactly 4 meters long. It's more than 4 meters but less than 5 meters. Is it closer to 4 or 5 meters?
S: 4 meters.
T: So, we can say it's about 4 meters long. (Record 4 m on the board.)
T: We use the meter tape in exactly the same way. When would the meter tape be an appropriate measuring tool?
S: When I am measuring my head. → When I am measuring something round. → When I am measuring something that is not straight.
T: I want to build a bookshelf for our science books. Let's use the centimeter rulers we made yesterday to measure the height of our books to see how high the shelf should be. Turn to your neighbor and estimate the height of your science book.
S: (Estimate.)
T: Measure your science book from top to bottom. How high should my shelf be?
S: (Share answers.)
T: Now, we need to see how long the shelf should be to hold all the books. (Call students up table by table to stack their books in one pile.)
T: Which is the best tool to measure our stack of books?
S: The meter stick or the meter tape!
T: (Call on a student volunteer to measure the stack of books.)
T: The bookshelf will need to be 20 cm high and 92 cm long. Work with your partner to use your measurement tools to measure spaces around the room. Where will the bookshelf fit?
S: (Work in pairs to find a place for the bookshelf.)
T: (Call students back together and share places the bookshelf could go.)
T: Now, you will have some time to continue planning for our redecoration. Measure objects around the room using an appropriate measuring tool. Record your measurements as you go. (Present Problem Set.)

Problem Set (10 minutes)

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. For some classes, it may be appropriate to modify the assignment by specifying which problems they work on first. Some problems do not specify a method for solving. Students should solve these problems using the RDW approach used for Application Problems.

Student Debrief (10 minutes)

Lesson Objective: Measure various objects using centimeter rulers and meter sticks.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

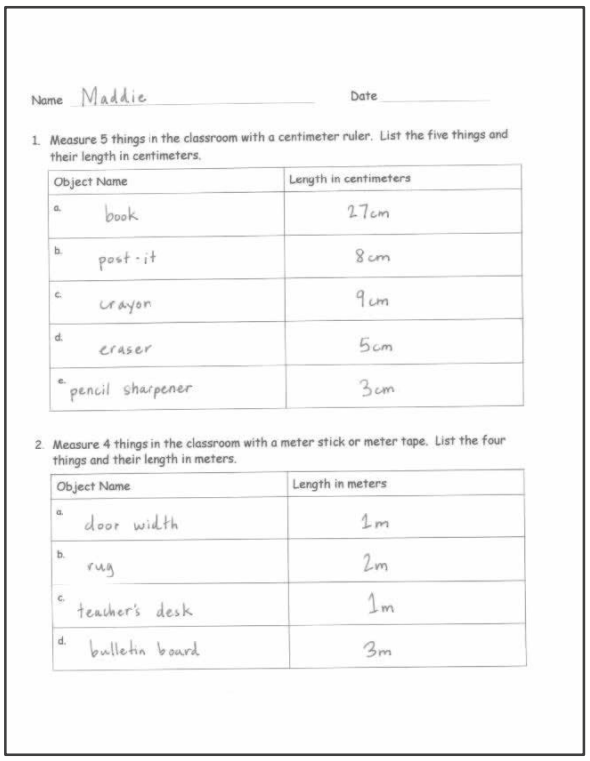
Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson.

Any combination of the questions below may be used to lead the discussion.

- Share with your partner. Which things did you measure in centimeters? Why? Which things did you measure in meters? Why?
- Did you or your partner disagree on any of the measurement tools you selected? Defend your choice.
- How do the size and shape of what we measure tell us which tool is most appropriate?
- What new (or significant) math vocabulary did we learn today? (Chart student responses. Prompt students to list vocabulary from the lesson such as *measure, measurement, length, height, length unit, measuring tool, meter tape,* ***meter,*** and ***meter stick***.)

Exit Ticket (3 minutes)

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help with assessing students' understanding of the concepts that were presented in today's lesson and planning more effectively for future lessons. The questions may be read aloud to the students.



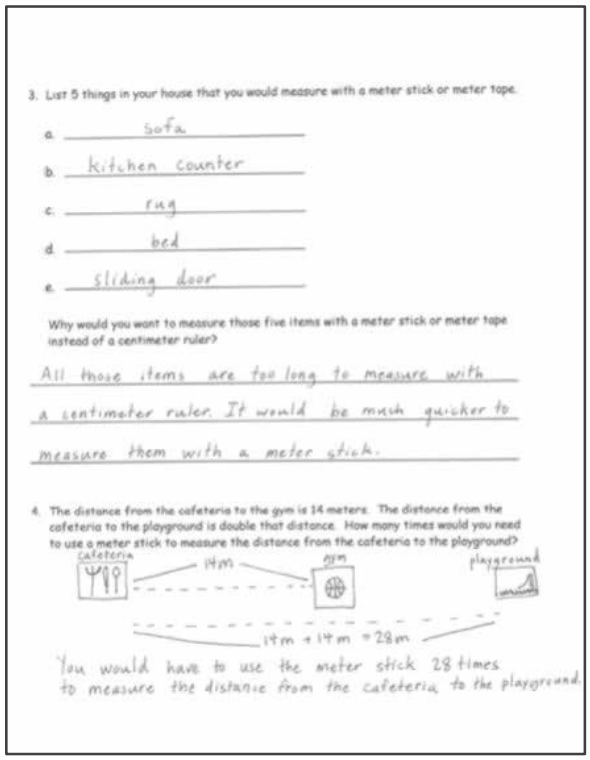
Name Maddie Date

1. Measure 5 things in the classroom with a centimeter ruler. List the five things and their length in centimeters.

Object Name	Length in centimeters
a. book	27cm
b. post-it	8cm
c. crayon	9cm
d. eraser	5cm
e. pencil sharpener	3cm

2. Measure 4 things in the classroom with a meter stick or meter tape. List the four things and their length in meters.

Object Name	Length in meters
a. door width	1m
b. rug	2m
c. teacher's desk	1m
d. bulletin board	3m



3. List 5 things in your house that you would measure with a meter stick or meter tape.

a. sofa
b. kitchen counter
c. rug
d. bed
e. sliding door

Why would you want to measure those five items with a meter stick or meter tape instead of a centimeter ruler?

All those items are too long to measure with a centimeter ruler. It would be much quicker to measure them with a meter stick.

4. The distance from the cafeteria to the gym is 14 meters. The distance from the cafeteria to the playground is double that distance. How many times would you need to use a meter stick to measure the distance from the cafeteria to the playground?

You would have to use the meter stick 28 times to measure the distance from the cafeteria to the playground.

A

Number Correct: _____

Related Facts

1.	8 + 3 =	
2.	3 + 8 =	
3.	11 – 3 =	
4.	11 – 8 =	
5.	7 + 4 =	
6.	4 + 7 =	
7.	11 – 4 =	
8.	11 – 7 =	
9.	9 + 3 =	
10.	3 + 9 =	
11.	12 – 3 =	
12.	12 – 9 =	
13.	8 + 5 =	
14.	5 + 8 =	
15.	13 – 5 =	
16.	13 – 8 =	
17.	7 + 5 =	
18.	5 + 7 =	
19.	12 – 5 =	
20.	12 – 7 =	
21.	9 + 6 =	
22.	6 + 9 =	

23.	15 – 6 =	
24.	15 – 9 =	
25.	8 + 7 =	
26.	7 + 8 =	
27.	15 – 7 =	
28.	15 – 8 =	
29.	9 + 4 =	
30.	4 + 9 =	
31.	13 – 4 =	
32.	13 – 9 =	
33.	8 + 6 =	
34.	6 + 8 =	
35.	14 – 6 =	
36.	14 – 8 =	
37.	7 + 6 =	
38.	6 + 7 =	
39.	13 – 6 =	
40.	13 – 7 =	
41.	9 + 7 =	
42.	7 + 9 =	
43.	16 – 7 =	
44.	16 – 9 =	

B

Number Correct: _____

Improvement: _____

Related Facts

1.	9 + 2 =	
2.	2 + 9 =	
3.	11 – 2 =	
4.	11 – 9 =	
5.	6 + 5 =	
6.	5 + 6 =	
7.	11 – 5 =	
8.	11 – 6 =	
9.	8 + 4 =	
10.	4 + 8 =	
11.	12 – 4 =	
12.	12 – 8 =	
13.	7 + 6 =	
14.	6 + 7 =	
15.	13 – 6 =	
16.	13 – 7 =	
17.	9 + 3 =	
18.	3 + 9 =	
19.	12 – 3 =	
20.	12 – 9 =	
21.	8 + 7 =	
22.	7 + 8 =	

23.	15 – 7 =	
24.	15 – 8 =	
25.	9 + 6 =	
26.	6 + 9 =	
27.	15 – 6 =	
28.	15 – 9 =	
29.	7 + 5 =	
30.	5 + 7 =	
31.	12 – 5 =	
32.	12 – 7 =	
33.	9 + 5 =	
34.	5 + 9 =	
35.	14 – 5 =	
36.	14 – 9 =	
37.	8 + 6 =	
38.	6 + 8 =	
39.	14 – 6 =	
40.	14 – 8 =	
41.	9 + 8 =	
42.	8 + 9 =	
43.	17 – 8 =	
44.	17 – 9 =	

Name _____ Date _____

1. Measure five things in the classroom with a centimeter ruler. List the five things and their length in centimeters.

Object Name	Length in Centimeters
a.	
b.	
c.	
d.	
e.	

2. Measure four things in the classroom with a meter stick or meter tape. List the four things and their length in meters.

Object Name	Length in Meters
a.	
b.	
c.	
d.	

3. List five things in your house that you would measure with a meter stick or meter tape.

   a. _____

   b. _____

   c. _____

   d. _____

   e. _____

   Why would you want to measure those five items with a meter stick or meter tape instead of a centimeter ruler?

   _____

   _____

   _____

4. The distance from the cafeteria to the gym is 14 meters. The distance from the cafeteria to the playground is double that distance. How many times would you need to use a meter stick to measure the distance from the cafeteria to the playground?

Name _____ Date _____

1. Circle cm (centimeter) or m (meter) to show which measurement you would use to measure the length of each object.

   a. Length of a train cm or m

   b. Length of an envelope cm or m

   c. Length of a house cm or m

2. Would it take more meters or more centimeters to measure the length of a playground? Explain your answer.

_____

_____

_____

_____

Name _____ Date _____

1. Circle cm (centimeter) or m (meter) to show which unit you would use to measure the length of each object.

   a. Length of a marker cm or m

   b. Length of a school bus cm or m

   c. Length of a laptop computer cm or m

   d. Length of a highlighter marker cm or m

   e. Length of a football field cm or m

   f. Length of a parking lot cm or m

   g. Length of a cell phone cm or m

   h. Length of a lamp cm or m

   i. Length of a supermarket cm or m

   j. Length of a playground cm or m

2. Fill in the blanks with **cm** or **m**.

   a. The length of a swimming pool is 25 _____.

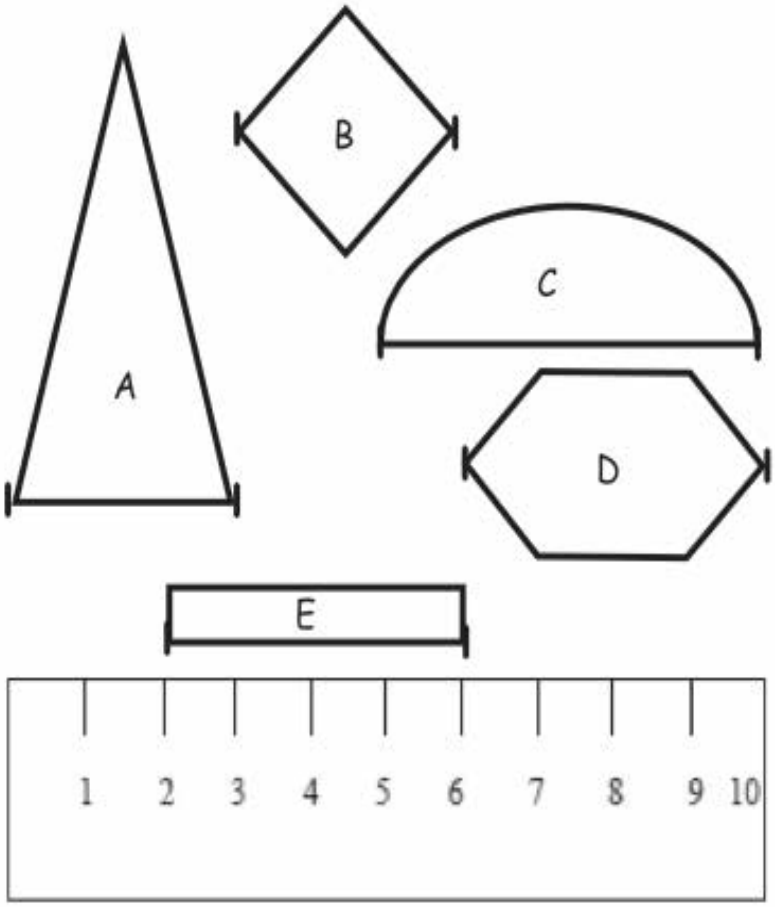
   b. The height of a house is 8 _____.

   c. Karen is 6 _____ shorter than her sister.

   d. Eric ran 65 _____ down the street.

   e. The length of a pencil box is 3 _____ longer than a pencil.

3. Use the centimeter ruler to find the length (from one mark to the next) of each object.



a. Triangle A is _____ cm long. Rhombus B is _____ cm long.

Semicircle C is _____ cm long. Hexagon D is _____ cm long.

Rectangle E is _____ cm long.

b. Explain how the strategy to find the length of each shape above is different from how you would find the length if you used a centimeter cube.

_____

_____

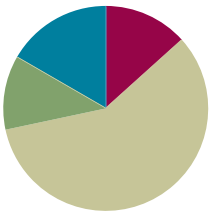
_____

Lesson 5

Objective: Develop estimation strategies by applying prior knowledge of length and using mental benchmarks.

Suggested Lesson Structure

Fluency Practice	(8 minutes)
Application Problem	(7 minutes)
Concept Development	(35 minutes)
Student Debrief	(10 minutes)
Total Time	**(60 minutes)**



Fluency Practice (8 minutes)

- Break Apart by Tens and Ones (4 minutes)
- Take Out a Part (4 minutes)

Break Apart by Tens and Ones (4 minutes)

Materials: (S) Personal white board

Note: This fluency activity reviews place value understanding from Module 1 and helps develop skills needed for Module 3.

T: If I say 64, you write 6 tens 4 ones. If I say 7 tens 2 ones, you write 72.
T: Turn your board over when you've written your answer. When I say, "Show me," hold it up.
T: 5 tens 2 ones. (Pause.) Show me.
S: (Hold up board showing 52.)
T: 84. (Pause.) Show me.
S: (Show 8 tens 4 ones.)

Continue with the following possible sequence: 7 tens 3 ones, 79, 8 tens 9 ones, 9 tens 9 ones, 10 tens 2 ones, 10 tens 4 ones, 104, 10 tens 8 ones, 11 tens, and 11 tens 5 ones.

T: Partner B, quiz Partner A for one minute.

Take Out a Part (4 minutes)

Note: In this activity, students build fluency with decomposing a whole, which allows them to use the make a ten strategy with larger numbers (e.g., 80 + 50 = 80 + 20 + 30).

T: Let's take out 2 tens from each number.
T: I say 5 tens. You say, 2 tens + 3 tens = 5 tens.
T: 5 tens.
S: 2 tens + 3 tens = 5 tens.
T: 7 tens.
S: 2 tens + 5 tens = 7 tens.
T: Let's take out 20 from each number.
T: I say 50. You say, 20 + 30 = 50.
T: 50.
S: 20 + 30 = 50.
T: 70.
S: 20 + 50 = 70.

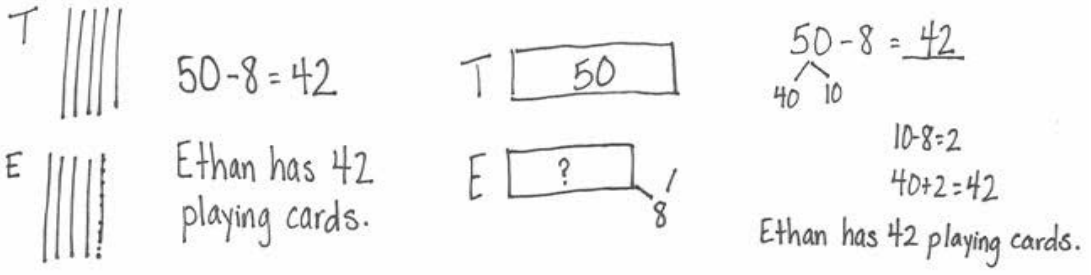
Continue with the following possible sequence: 83, 52, 97, 100, 105, 110, and 120.

T: Now, let's take out 40. If I say 60, you say 40 + 20 = 60.
T: 50. Wait for the signal.
S: 40 + 10 = 50.

Continue with the following possible sequence: 70, 75, 81, and 87.

Application Problem (7 minutes)

Ethan has 8 fewer playing cards than Tristan. Tristan has 50 playing cards. How many playing cards does Ethan have?



Note: This *compare with smaller unknown* problem uses the word *fewer*, which probably will suggest subtraction to students. The numbers were purposely chosen so students have the opportunity to use the take from ten strategy to solve.

Concept Development (35 minutes)

Materials: (T) Meter stick (displayed horizontally for student reference), three-ring binder
(S) 1 unused unsharpened pencil, 1 centimeter cube, centimeter ruler from Lesson 3, meter tape, 1 wedge eraser

T: Put your pinky on your centimeter cube. Would you say it's about the same width as the centimeter cube?
S: Yes.
T: How could you use your pinky to estimate length?
S: I can tell how many times my pinky would fit into the space. → I can put my pinky down as many times as I can and then count.
T: Let's try that. Use your pinky to estimate. About how long do you think the eraser is? Turn to your neighbor and share your estimate.
S: About 6 centimeters.
T: Let's measure to see if your estimates are correct.
S: (Use centimeter rulers to check estimates.)
T: The distance from the floor to the doorknob is about 1 meter (verify by modeling). How does this help you estimate the length of your desk?
S: My desk is about half the length from the floor to the doorknob, so it's about 50 centimeters long. → My desk is twice the length from the floor to the doorknob, so I think it's about 2 meters long.
T: Let's measure to see which estimate is closer to the real measurement.
S: (Use meter tapes to measure their desks.)
T: Measure your pencil. How long is it?
S: About 20 centimeters.
T: Can that help you estimate the length of your math book? Estimate the length of your math book, and then measure it with your centimeter ruler to see how close you got.
S: My math book is longer than the pencil, but not by much. → They are almost the same. → I think it's about 23 centimeters. → I think it's 30 centimeters.
T: Picture the meter stick in your mind. Estimate how many meters long the classroom board is.

NOTES ON MULTIPLE MEANS OF REPRESENTATION:

In this lesson, students will be learning multiple benchmark measurements. To help all students remember the benchmarks, these techniques may prove useful:

- Partner language with visuals by posting pictures of the benchmarks.
- Instruct students to create a reference chart to keep track of the benchmarks as they learn them. They can later use this chart as a reference.

NOTES ON MULTIPLE MEANS OF ENGAGEMENT:

Use a chant to help students understand the conversion from meters to centimeters. Make gestures to accompany the chant.

T: When I say meter, you say 100 centimeters. (Open arms wide, about the length of a meter.)
T: Meter! (Open arms wide.)
S: 100 centimeters! (Open arms wide.)

This conversion is meant to support students' estimations of the length of their desks.

S: It looks like the board is a few meters long. → I can fit more than one meter stick along the length of the board. → I would say it is 2 meters long. → To me, it's longer than 2 meters, but shorter than 3 meters.

T: Let's check our estimates. (Call on a volunteer to measure the board for the class.)

T: Now, look at this three-ring binder. What known measurement can we use to estimate the length?

S: It looks about the same as my ruler, so 30 centimeters.

T: So, let's check and see if it is 30 centimeters.

S: (Volunteer measures the three-ring binder.)

T: It is. Now that we know this is 30 centimeters, what other lengths can we estimate with this information?

S: The length of my science book. → The length of the paper that goes inside the binder.

T: All these measurements we use to estimate length are called mental **benchmarks**. The pencil is about 20 centimeters. Your pinky is about 1 centimeter. The three-ring binder is about 30 centimeters. And, the length from the doorknob to the floor is about 1 meter. You can use these benchmarks at any time by picturing them in your head to estimate the length of an object. Now, use your mental benchmarks to estimate length on your Problem Set. Check your estimates by measuring.

NOTES ON MULTIPLE MEANS OF ACTION AND EXPRESSION:

Provide sufficient wait time to allow students to process the connection between mental benchmarks and length of objects. Point to or hold visuals while speaking.

Ask students to explain how and why they chose a specific mental benchmark when estimating length.

Problem Set (10 minutes)

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. For some classes, it may be appropriate to modify the assignment by specifying which problems they work on first. Some problems do not specify a method for solving. Students should solve these problems using the RDW approach used for Application Problems.

Note: Do not allow students to use their rulers to complete the Problem Set initially. Have them estimate the lengths first, and then, pull out their rulers and measure all the line segments at the very end. Otherwise, many students will measure, and then do the estimate.

Student Debrief (10 minutes)

Lesson Objective: Develop estimation strategies by applying prior knowledge of length and using mental benchmarks.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

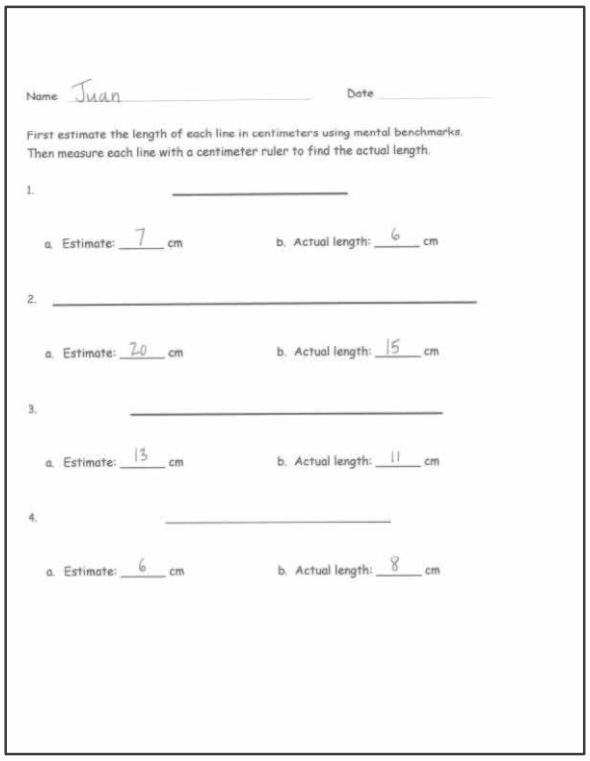
Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson.

Any combination of the questions below may be used to lead the discussion.

- Turn to your partner and compare your answers to Problems 1–5 in your Problem Set. Why is it possible to have different estimates? How can we check to see if our estimates are accurate?
- How many mental **benchmarks** can you name? (Draw students' attention to Problem 6 on their Problem Set. Chart student responses for future reference.)
- How do mental benchmarks help us? When is a good time to use them?

Exit Ticket (3 minutes)

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help with assessing students' understanding of the concepts that were presented in today's lesson and planning more effectively for future lessons. The questions may be read aloud to the students.



Name Juan Date

First estimate the length of each line in centimeters using mental benchmarks. Then measure each line with a centimeter ruler to find the actual length.

1.

a. Estimate: 7 cm b. Actual length: 6 cm

2.

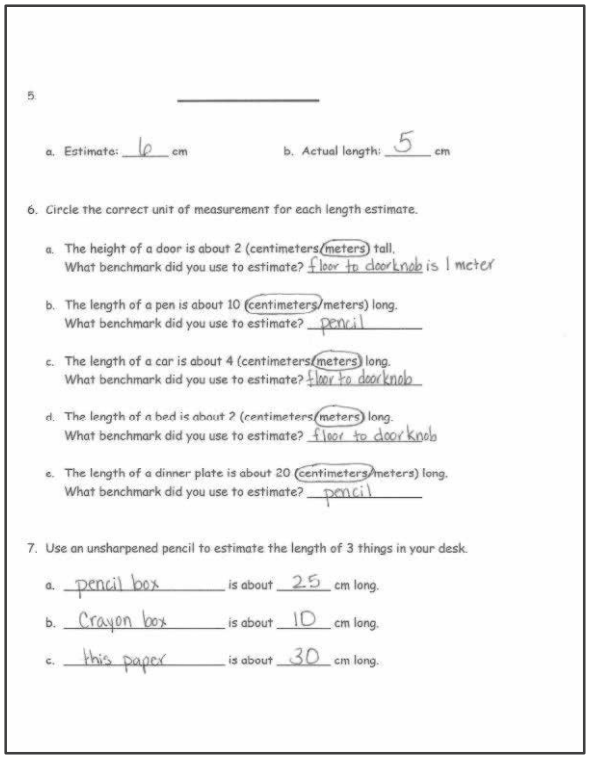
a. Estimate: 20 cm b. Actual length: 15 cm

3.

a. Estimate: 13 cm b. Actual length: 11 cm

4.

a. Estimate: 6 cm b. Actual length: 8 cm



5.

a. Estimate: 6 cm b. Actual length: 5 cm

6. Circle the correct unit of measurement for each length estimate.

a. The height of a door is about 2 (centimeters/meters) tall.
What benchmark did you use to estimate? floor to doorknob is 1 meter

b. The length of a pen is about 10 (centimeters/meters) long.
What benchmark did you use to estimate? pencil

c. The length of a car is about 4 (centimeters/meters) long.
What benchmark did you use to estimate? floor to doorknob

d. The length of a bed is about 2 (centimeters/meters) long.
What benchmark did you use to estimate? floor to doorknob

e. The length of a dinner plate is about 20 (centimeters/meters) long.
What benchmark did you use to estimate? pencil

7. Use an unsharpened pencil to estimate the length of 3 things in your desk.

a. pencil box is about 25 cm long.

b. Crayon box is about 10 cm long.

c. this paper is about 30 cm long.

Name _____ Date _____

First, estimate the length of each line in centimeters using mental benchmarks. Then, measure each line with a centimeter ruler to find the actual length.

1.

a. Estimate: _____ cm b. Actual length: _____ cm

2.

a. Estimate: _____ cm b. Actual length: _____ cm

3.

a. Estimate: _____ cm b. Actual length: _____ cm

4.

a. Estimate: _____ cm b. Actual length: _____ cm

5.

a. Estimate: _____ cm b. Actual length: _____ cm

6. Circle the correct unit of measurement for each length estimate.

   a. The height of a door is about 2 (centimeters/meters) tall.

      What benchmark did you use to estimate? _____

   b. The length of a pen is about 10 (centimeters/meters) long.

      What benchmark did you use to estimate? _____

   c. The length of a car is about 4 (centimeters/meters) long.

      What benchmark did you use to estimate? _____

   d. The length of a bed is about 2 (centimeters/meters) long.

      What benchmark did you use to estimate? _____

   e. The length of a dinner plate is about 20 (centimeters/meters) long.

      What benchmark did you use to estimate? _____

7. Use an unsharpened pencil to estimate the length of 3 things in your desk.

   a. _____ is about _____ cm long.

   b. _____ is about _____ cm long.

   c. _____ is about _____ cm long.

Name _____ Date _____

1. Circle the most reasonable estimate for each object.

   a. Length of a push pin 1 cm or 1 m

   b. Length of a classroom door 100 cm or 2 m

   c. Length of a pair of student scissors 17 cm or 42 cm

2. Estimate the length of your desk. (Remember, the width of your pinky is about 1 cm.)

   My desk is about _____ cm long.

3. How does knowing that an unsharpened pencil is about 20 cm long help you estimate the length of your arm from your elbow to your wrist?

_____

_____

_____

_____

Name _____ Date _____

1. Name five things in your home that you would measure in meters. Estimate their length.

   *Remember, the length from a doorknob to the floor is about 1 meter.

Item	Estimated Length
a.	
b.	
c.	
d.	
e.	

2. Choose the best length estimate for each object.

a.	Whiteboard	3 m	or	45 cm
b.	Banana	14 cm	or	30 cm
c.	DVD	25 cm	or	17 cm
d.	Pen	16 cm	or	1 m
e.	Swimming pool	50 m	or	150 cm

3. The width of your pinky finger is about 1 cm.

   Measure the length of the lines using your pinky finger. Write your estimate.

   a. Line A _____

      Line A is about _____ cm long.

   b. Line B _____

      Line B is about _____ cm long.

   c. Line C
      _____

      Line C is about _____ cm long.

   d. Line D _____

      Line D is about _____ cm long.

   e. Line E _____

      Line E is about _____ cm long.

Topic C

Measure and Compare Lengths Using Different Length Units

Focus Standards:	■	Measure the length of an object by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes.	
	■	Measure the length of an object twice, using length units of different lengths for the two measurements; describe how the two measurements relate to the size of the unit chosen.	
	■	Measure to determine how much longer one object is than another, expressing the length difference in terms of a standard length unit.	
Instructional Days:	2		
Coherence -Links from:	GK–M3	Comparison of Length, Weight, Capacity, and Numbers to 10	
	G1–M6	Place Value, Comparison, Addition and Subtraction to 100	
-Links to:	G3–M2	Place Value and Problem Solving with Units of Measure	
	G3–M4	Multiplication and Area	
	G3–M7	Geometry and Measurement Word Problems	

In Topic C, students use different length units to measure and compare lengths. They practice applying their knowledge of centimeters and meters to choose an appropriate measurement tool in Lesson 6. Students discover that there is a relationship between unit size and measurement when they measure one object twice using different length units. They learn that the larger the unit, the fewer number of units in a given measurement. In Lesson 7, students continue to measure and compare lengths using standard and non-standard length units. At this point, students are prepared to explicitly compare different non-standard length units and can make inferences about the relative size of objects.

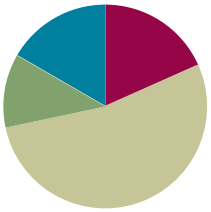
A Teaching Sequence Toward Mastery of Measuring and Comparing Lengths Using Different Length Units	
Objective 1:	**Measure and compare lengths using centimeters and meters. (Lesson 6)**
Objective 2:	**Measure and compare lengths using standard metric length units and non-standard length units; relate measurement to unit size. (Lesson 7)**

Lesson 6

Objective: Measure and compare lengths using centimeters and meters.

Suggested Lesson Structure

Fluency Practice	(11 minutes)
Application Problem	(7 minutes)
Concept Development	(32 minutes)
Student Debrief	(10 minutes)
Total Time	**(60 minutes)**



Fluency Practice (11 minutes)

- Happy Counting (2 minutes)
- Sprint: Find the Longer Length (9 minutes)

Happy Counting (2 minutes)

Materials: (T) 2 meter sticks

Note: Students fluently count by tens crossing the hundred and relate it to metric units.

T: Let's do some Happy Counting in centimeters. Watch me as I pinch the meter stick where the centimeters are while we count. When I get to 100 centimeters (1 meter), I will call a volunteer to hold another meter stick.

T: Let's count by tens, starting at 70 centimeters. When we get to 100 centimeters, we say 1 meter, and then we will go back to counting by centimeters. Ready? (Pinch the meter stick to stop on a number, moving pinched fingers up and down to lead students in Happy Counting by tens on the meter stick.)

S: 70 cm, 80 cm, 90 cm, 1 m, 110 cm, 120 cm. (Switch direction.) 110 cm, 1 m, 90 cm, 80 cm. (Switch direction.) 90 cm, 1 m, 110 cm, 120 cm.

T: Now, let's say it with meters and centimeters. Let's start at 80 centimeters. Ready?

S: 80 cm, 90 cm, 1 m, 1 m 10 cm, 1 m 20 cm, 1 m 30 cm, 1 m 40 cm. (Switch direction.) 1 m 30 cm, 1 m 20 cm. (Switch direction.) 1 m 30 cm, 1 m 40 cm, 1 m 50 cm, 1 m 60 cm, 1 m 70 cm, 1 m 80 cm, 1 m 90 cm, 2 m.

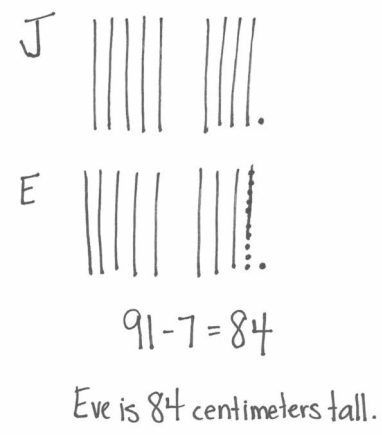
Sprint: Find the Longer Length (9 minutes)

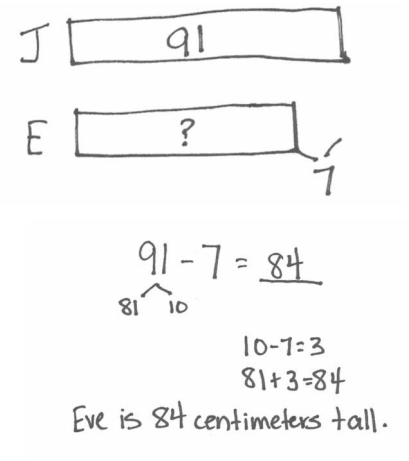
Materials: (S) Find the Longer Length Sprint

Note: Students prepare for comparing lengths in the lesson by identifying the longer length in a Sprint.

Application Problem (7 minutes)

Eve is 7 centimeters shorter than Joey. Joey is 91 centimeters tall. How tall is Eve?





In today's lesson, students measure and compare lengths in centimeters and meters. This *compare with smaller unknown* problem is similar to the problem in Lesson 5, but here measurement units are used with *shorter than* rather than *less than* or *fewer than*.

Concept Development (32 minutes)

Materials: (S) Personal white board, centimeter ruler, meter strip (Template); 2 sheets of paper per pair

Note: Meter strips can be made either in advance of the lesson or by students during the lesson.

T: I want to know: How long is the paper? With your pencil, label this side *A*. (Point to the longer side.)
S: (Write an A along the length of the paper.)
T: Use your **meter strip** to measure Side A, and then write the measurement.
S: (Measure and record.)
T: Label this side *B*. (Point.)
S: (Write a B along the width of the paper.)
T: How wide is the paper? Measure Side B and record the measurement.
S: (Measure and record.)
T: Which side is longer, Side A or Side B?
S: Side A.

NOTES ON MULTIPLE MEANS OF ACTION AND EXPRESSION:

Couple comparative vocabulary with illustrative gestures and questions such as the following:

- Who is taller? Shorter? (Ask with students standing back to back.)
- How wide is this shoe? How long? Which shoe is longer? Which shoe is shorter?
- Point to visuals while speaking to highlight the corresponding vocabulary.

T: How can I find out how much longer? Figure out a way with your partner.
S: Put two of them next to each other to see. → You could measure. → Measure and subtract.
T: Go to your seat with your partner and find out: How much longer is Side A than Side B?

Students go to their seats with two pieces of paper and solve the problem. Allow two to three minutes for students to complete the task. Observe student strategies to choose who will share. Select two or three students who use different approaches to share with the class.

T: Who would like to share the strategy they used?
S: I lined up the two pieces of paper and measured the one that was sticking out. → I measured both sides and counted on.
T: What strategy could you use if you only had one piece of paper?
S: Measure and add on! → Measure and subtract!
T: (Model measuring the difference in length using both strategies.)

Repeat the process above using the meter strips to measure and compare the lengths of other objects around the room (e.g., desks and classroom board, the width of the door and the height of the door, the length of a bookcase and the height of a bookcase, student desk and teacher desk). Allow students to record their measurements and work on their personal white board or in their math journal. Then, have students complete the Problem Set.

Problem Set (10 minutes)

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. For some classes, it may be appropriate to modify the assignment by specifying which problems they work on first. Some problems do not specify a method for solving. Students should solve these problems using the RDW approach used for Application Problems.

Student Debrief (10 minutes)

Lesson Objective: Measure and compare lengths using centimeters and meters.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson.

NOTES ON MULTIPLE MEANS OF ENGAGEMENT:

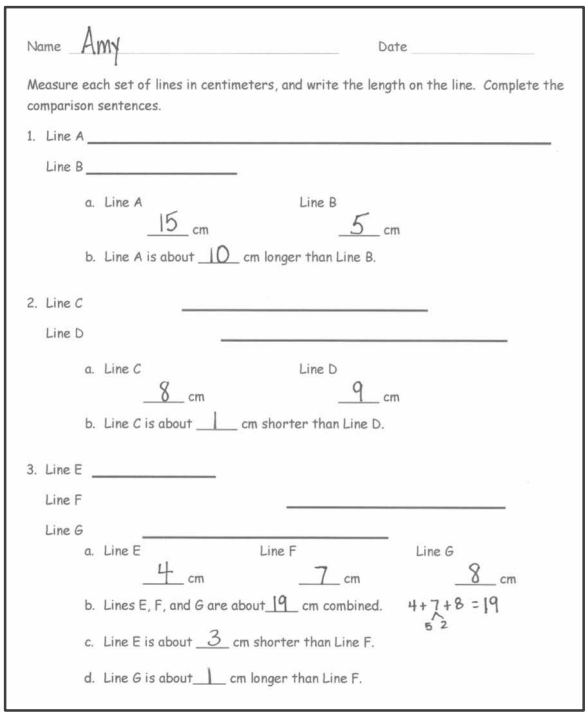
The language of comparison may be particularly challenging for English language learners. Scaffold understanding of Problem 5 in the Problem Set using these techniques:

- Break down the problem into small, workable chunks (e.g., "If Alice's ribbon is 1 meter long, how many centimeters long is her ribbon?")
- Reframe the comparing sentence (e.g., "How much *more* ribbon does Alice have than Carol?")
- Teach students to ask themselves questions. "What type of problem is this? What do I know? What is unknown?"

These scaffolds also support Problem 6 on the Problem Set.

Any combination of the questions below may be used to lead the discussion.

- For Problems 1–3, discuss with your partner how you determined the difference in length of the lines you measured. What is interesting about Line F in Problem 3?
- How did finding the missing addend in Problem 4 help you to answer Problem 5?
- Explain to your partner how you solved Problem 6 or Problem 7. How did you show your thinking?
- When you were measuring the paper today, how did your strategy change the second time you solved the problem? Which strategy was more efficient and accurate?
- How would you convince me that there is a benefit to measuring with centimeters versus meters? How about a ruler versus a **meter strip**?



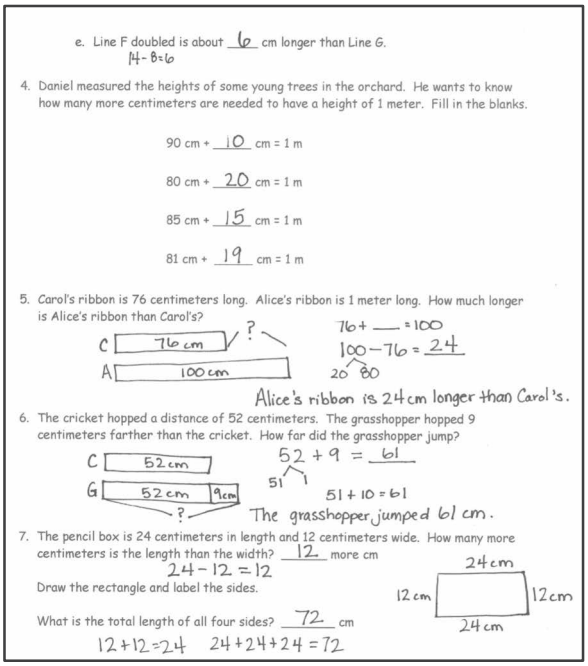
Name Amy Date

Measure each set of lines in centimeters, and write the length on the line. Complete the comparison sentences.

1. Line A _____
   Line B _____
   a. Line A 15 cm Line B 5 cm
   b. Line A is about 10 cm longer than Line B.
2. Line C _____
   Line D _____
   a. Line C 8 cm Line D 9 cm
   b. Line C is about 1 cm shorter than Line D.
3. Line E _____
   Line F _____
   Line G _____
   a. Line E 4 cm Line F 7 cm Line G 8 cm
   b. Lines E, F, and G are about 19 cm combined. 4+7+8=19 (5, 2)
   c. Line E is about 3 cm shorter than Line F.
   d. Line G is about 1 cm longer than Line F.

Exit Ticket (3 minutes)

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help with assessing students' understanding of the concepts that were presented in today's lesson and planning more effectively for future lessons. The questions may be read aloud to the students.



e. Line F doubled is about 6 cm longer than Line G. 14-8=6

4. Daniel measured the heights of some young trees in the orchard. He wants to know how many more centimeters are needed to have a height of 1 meter. Fill in the blanks.

   90 cm + 10 cm = 1 m
   80 cm + 20 cm = 1 m
   85 cm + 15 cm = 1 m
   81 cm + 19 cm = 1 m

5. Carol's ribbon is 76 centimeters long. Alice's ribbon is 1 meter long. How much longer is Alice's ribbon than Carol's?

   C 76 cm ? A 100 cm
   76 + ___ = 100
   100 − 76 = 24 (20, 80)
   Alice's ribbon is 24 cm longer than Carol's.

6. The cricket hopped a distance of 52 centimeters. The grasshopper hopped 9 centimeters farther than the cricket. How far did the grasshopper jump?

   C 52 cm
   G 52 cm 9 cm ?
   52 + 9 = 61 (51, 1)
   51 + 10 = 61
   The grasshopper jumped 61 cm.

7. The pencil box is 24 centimeters in length and 12 centimeters wide. How many more centimeters is the length than the width? 12 more cm
   24 − 12 = 12
   Draw the rectangle and label the sides.
   What is the total length of all four sides? 72 cm
   12+12=24 24+24+24=72

A

Number Correct: _____

Circle the longer length.

1.	1 cm	0 cm
2.	11 cm	10 cm
3.	11 cm	12 cm
4.	22 cm	12 cm
5.	29 cm	30 cm
6.	31 cm	13 cm
7.	43 cm	33 cm
8.	33 cm	23 cm
9.	35 cm	53 cm
10.	50 cm	35 cm
11.	55 cm	45 cm
12.	50 cm	55 cm
13.	65 cm	56 cm
14.	66 cm	56 cm
15.	66 cm	86 cm
16.	86 cm	68 m
17.	68 cm	88 cm
18.	89 cm	98 cm
19.	99 cm	98 m
20.	99 cm	1 m
21.	1 m	101 cm
22.	1 m	90 cm
23.	110 cm	101 cm
24.	110 cm	1 m
25.	1 m	111 cm
26.	101 cm	1 m
27.	111 cm	101 cm
28.	112 cm	102 cm
29.	110 cm	115 cm
30.	115 cm	105 cm
31.	106 cm	116 cm
32.	108 cm	98 cm
33.	119 cm	99 cm
34.	131 cm	133 cm
35.	133 cm	113 cm
36.	142 cm	124 cm
37.	144 cm	114 cm
38.	154 cm	145 cm
39.	155 cm	152 cm
40.	198 cm	199 cm
41.	215 cm	225 cm
42.	252 cm	255 cm
43.	2 m	295 cm
44.	3 m	295 cm

B

Number Correct: _____

Improvement: _____

Circle the longer length.

1.	0 cm	1 cm
2.	10 cm	12 cm
3.	12 cm	11 cm
4.	32 cm	13 cm
5.	39 cm	40 cm
6.	41 cm	14 cm
7.	44 cm	40 cm
8.	44 cm	54 cm
9.	55 cm	65 cm
10.	60 cm	59 cm
11.	65 cm	45 cm
12.	70 cm	65 cm
13.	75 cm	57 cm
14.	77 cm	76 cm
15.	87 cm	78 cm
16.	79 cm	97 m
17.	79 cm	88 cm
18.	98 cm	97 cm
19.	99 cm	1 m
20.	99 cm	100 cm
21.	101 cm	100 cm
22.	1 m	101 cm
23.	111 cm	101 cm
24.	101 cm	110 cm
25.	1 m	110 cm
26.	111 cm	1 m
27.	113 cm	117 cm
28.	112 cm	111 cm
29.	115 cm	105 cm
30.	106 cm	116 cm
31.	107 cm	117 cm
32.	118 cm	108 cm
33.	119 cm	120 cm
34.	132 cm	123 cm
35.	133 cm	132 cm
36.	143 cm	134 cm
37.	144 cm	114 cm
38.	154 cm	145 cm
39.	155 cm	152 cm
40.	195 cm	199 cm
41.	225 cm	152 cm
42.	252 cm	255 cm
43.	2 m	295 cm
44.	3 m	295 cm

Name _____ Date _____

Measure each set of lines in centimeters, and write the length on the line. Complete the comparison sentences.

1. Line A _____

   Line B _____

   a. Line A _____ cm Line B _____ cm

   b. Line A is about _____ cm longer than Line B.

2. Line C _____

   Line D _____

   a. Line C _____ cm Line D _____ cm

   b. Line C is about _____ cm shorter than Line D.

3. Line E

   Line F

   Line G

   a. Line E _____ cm Line F _____ cm Line G _____ cm

   b. Lines E, F, and G are about_____ cm combined.

   c. Line E is about _____ cm shorter than Line F.

   d. Line G is about_____ cm longer than Line F.

   e. Line F doubled is about _____ cm longer than Line G.

4. Daniel measured the heights of some young trees in the orchard. He wants to know how many more centimeters are needed to have a height of 1 meter. Fill in the blanks.

   a. 90 cm + _____ cm = 1 m

   b. 80 cm + _____ cm = 1 m

   c. 85 cm + _____ cm = 1 m

   d. 81 cm + _____ cm = 1 m

5. Carol's ribbon is 76 centimeters long. Alice's ribbon is 1 meter long. How much longer is Alice's ribbon than Carol's?

6. The cricket hopped a distance of 52 centimeters. The grasshopper hopped 9 centimeters farther than the cricket. How far did the grasshopper jump?

7. The pencil box is 24 centimeters in length and 12 centimeters wide. How many more centimeters is the length than the width? _____ more cm

   Draw the rectangle and label the sides.

   What is the total length of all four sides? _____ cm

Name _____ Date _____

Measure the length of each line and compare.

Line M

Line N

Line O

1. Line M is about _____ cm longer than Line O.

2. Line N is about _____ cm shorter than Line M.

3. Line N doubled would be about _____ cm (longer/shorter) than Line M.

Name _____ Date _____

Measure each set of lines in centimeters, and write the length on the line. Complete the comparison sentences.

1. Line A _____

   Line B _____

   a. Line A is about _____ cm longer than line B.

   b. Line A and B are about _____ cm combined.

2. Line X _____

   Line Y _____

   Line Z _____

   a. Line X _____ cm Line Y _____ cm Line Z _____ cm

   b. Lines X, Y, and Z are about_____ cm combined.

   c. Line Z is about _____ cm shorter than Line X.

   d. Line X is about _____ cm shorter than Line Y.

   e. Line Y is about _____ cm longer than Line Z.

   f. Line X doubled is about _____ cm longer than line Y.

3. Line J is 60 cm long. Line K is 85 cm long. Line L is 1 m long.

   a. Line J is _____ cm shorter than line K.

   b. Line L is _____ cm longer than line K.

   c. Line J doubled is _____ cm more than line L.

   d. Lines J, K, and L combined are _____ cm.

4. Katie measured the seat height of four different chairs in her house. Here are her results:

   Loveseat height: 51 cm
   Dining room chair height: 55 cm
   Highchair height: 97 cm
   Counter stool height: 65 cm

   a. How much shorter is the dining room chair than the counter stool? _____ cm

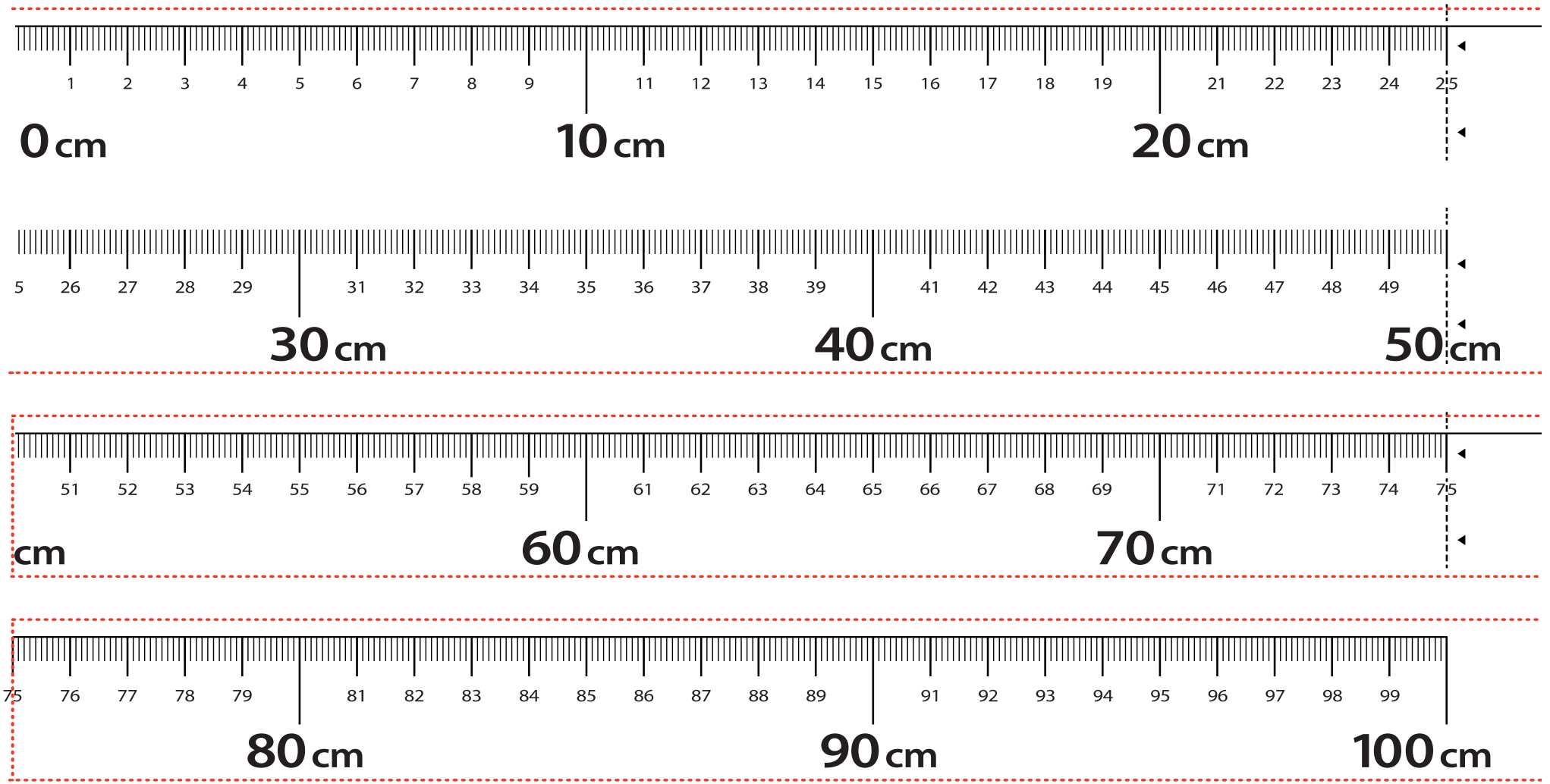
   b. How much taller is a meter stick than the counter stool? _____ cm

   c. How much taller is a meter stick than the loveseat? _____ cm

5. Max ran 15 meters this morning. This afternoon, he ran 48 meters.

   a. How many more meters did he run in the afternoon?

   b. How many meters did Max run in all?



LEGEND ------ CUT - - - - ALIGN EDGE

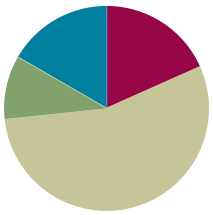
Lesson 6: Measure and compare lengths using centimeters and meters.

Lesson 7

Objective: Measure and compare lengths using standard metric length units and non-standard length units; relate measurement to unit size.

Suggested Lesson Structure

Fluency Practice	(11 minutes)
Application Problem	(6 minutes)
Concept Development	(33 minutes)
Student Debrief	(10 minutes)
Total Time	**(60 minutes)**



Fluency Practice (11 minutes)

- Which Is Shorter? (2 minutes)
- Sprint: Subtraction (9 minutes)

Which Is Shorter? (2 minutes)

Note: Students prepare for comparing lengths by identifying the shorter length and providing the number sentence to find the difference.

T: I am going to say two lengths. Tell me which length is shorter. Ready? 6 centimeters or 10 centimeters?
S: 6 centimeters.
T: Give the number sentence to find how much shorter.
S: 10 cm – 6 cm = 4 cm.

Continue with the following possible sequence: 12 cm and 22 cm, 16 cm and 20 cm, 20 cm and 13 cm, 20 cm and 9 cm, 9 cm and 19 cm, 24 cm and 14 cm, 12 cm and 24 cm, 23 cm and 15 cm, and 18 cm and 29 cm.

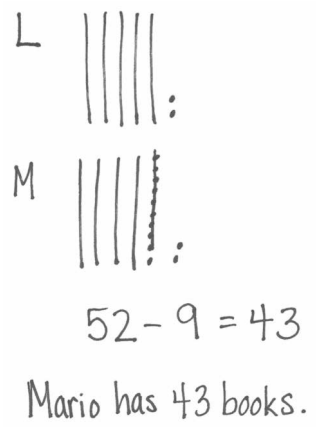
Sprint: Subtraction (9 minutes)

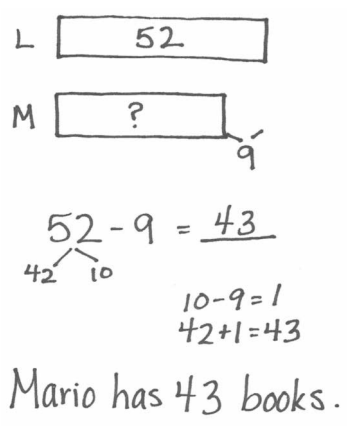
Materials: (S) Subtraction Sprint

Note: Students practice their simple subtraction skills in preparation for the lesson content.

Application Problem (6 minutes)

Luigi has 9 more books than Mario. Luigi has 52 books. How many books does Mario have?





Note: This *compare with smaller unknown* problem has the complexity that we subtract to find the number of books Mario has, though there is no action of taking away, and the word *more* in the first sentence might suggest addition to students. *More* and *more than* are often mistakenly taught as key words signaling either to add or subtract. This approach distracts students from the more essential task of considering the part–whole relationships within a problem after representing it with a drawing.

Concept Development (33 minutes)

Materials: (S) Personal white board, 1 30-centimeter ruler (various types, e.g., wood, plastic, tape), 1 small resealable bag per pair (containing 1 straw, 1 new crayon, 1 wedge eraser, 1 square sticky note, 30 large or small paper clips)

Note: Prepare half of the bags with small paper clips and half the bags with large paper clips. Use only one size paper clip per table so partners don't see that they are different sizes.

T: Measure your straw with your paper clips.
S: (Measure.)
T: How long is the straw?
S: 6 paper clips long. → About 5 paper clips long.
T: (Record measurements on the board.)
T: Why do you think the measurements are different? Turn and talk.
S: Maybe they didn't start at the beginning of the straw. → They measured wrong.

NOTES ON MULTIPLE MEANS OF REPRESENTATION:

Extend thinking by connecting to real-world experiences. Ask students, "What are some other items you might use to measure your straw?" Students will identify objects that are easy to use as a measure (e.g., erasers, fingers, crayons) either by using mark and move forward or by laying multiple copies.

T: Take out your crayon and measure with your paper clips. Share your measurement with your partner.

Students continue to measure the other items in their bags. After each item, discuss and record the measurement (in paper clips) of each item. Notice that measurements are different, but do not explain why.

T: Let's switch bags with our neighbors and measure again.

Tables now switch bags and measure all items in the bag using the other size paper clip. Record measurements on the board. Have students discuss the difference between the measurements made using the large paper clips and those using the small paper clips.

T: Do you know why your measurements were different?
S: We had different size paper clips!
T: Why does the size of my paper clip matter?
S: You can fit more small paper clips than big paper clips along the side of the item.
T: What does that tell you about measurement and unit size?
S: If it's a small unit size, you get a bigger measurement number.
T: Let's measure again using small and big paper clips mixed together.
S: (Use varying amounts of small and big paper clips to measure their straws.)
T: What were your results? (Record results.)
T: Why are all these measurements different?
S: We all had different sizes. → Some people had lots of big paper clips.
T: So, if I wanted to order a table and I told you I want it to be 80 paper clips long, what might happen?
S: They wouldn't know which one you want. → You could get a big table or a tiny table.
T: (Pass out different types of centimeter rulers, e.g., tape measures, wooden rulers, plastic rulers. Have students re-measure each object in their bags. Record the measurements on the board in centimeters.)
T: What do you notice about the measurement of the object when you use a centimeter ruler?
S: The measurements for each object are the same even if the ruler looks different.
T: What is the same about all the rulers?
S: They are the same, except one is wood and one is plastic. → The rulers all have centimeters. → The centimeters are all the same size.
T: Why is it more efficient to measure with a centimeter instead of paper clips?
S: Because everyone knows how big a centimeter is. → All centimeters are the same.

NOTES ON MULTIPLE MEANS OF ENGAGEMENT:

Inverse relationships require thoughtful consideration because they seem to challenge logic and reasoning.

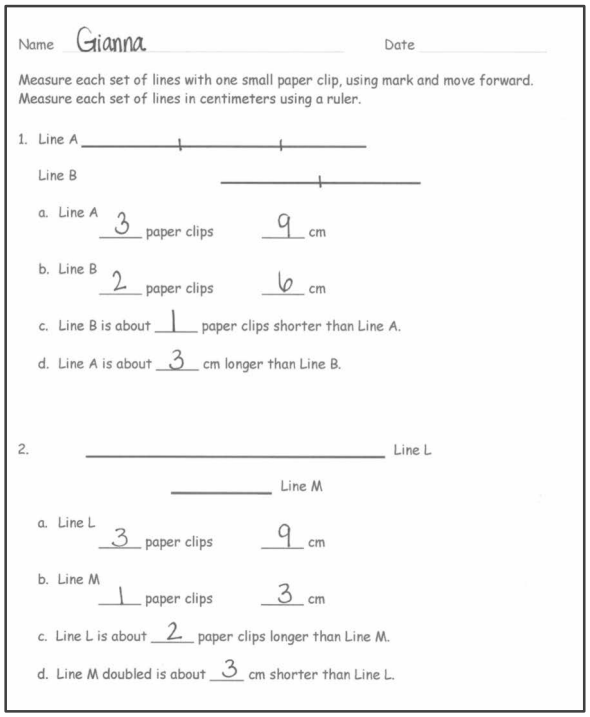
Post sentence frames for English language learners for reference during the Student Debrief:

"The _____ the unit, the _____ number of units in a given measurement."

Invite students to brainstorm real-life examples of inverse relationships. (The longer you sleep in the morning, the less time you have to get ready for school.)

Problem Set (10 minutes)

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. For some classes, it may be appropriate to modify the assignment by specifying which problems they work on first. Some problems do not specify a method for solving. Students should solve these problems using the RDW approach used for Application Problems.

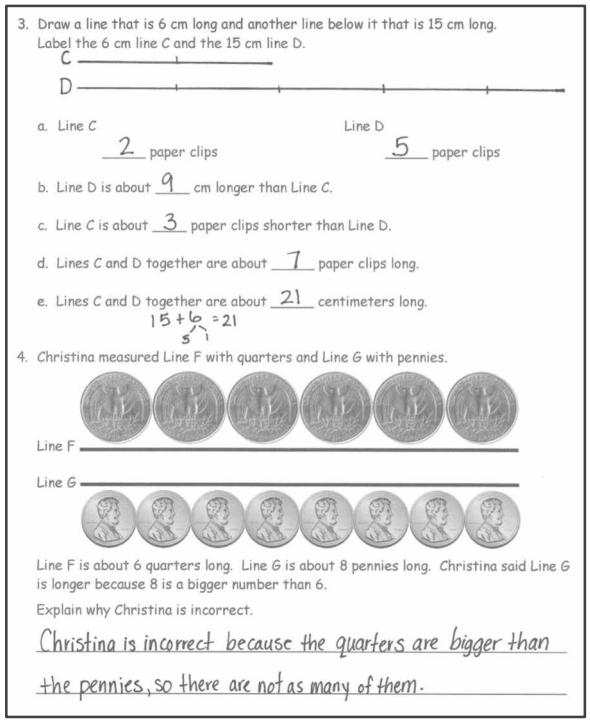


Name Gianna Date

Measure each set of lines with one small paper clip, using mark and move forward. Measure each set of lines in centimeters using a ruler.

1. Line A
Line B
a. Line A 3 paper clips 9 cm
b. Line B 2 paper clips 6 cm
c. Line B is about 1 paper clips shorter than Line A.
d. Line A is about 3 cm longer than Line B.

2. Line L
Line M
a. Line L 3 paper clips 9 cm
b. Line M 1 paper clips 3 cm
c. Line L is about 2 paper clips longer than Line M.
d. Line M doubled is about 3 cm shorter than Line L.



3. Draw a line that is 6 cm long and another line below it that is 15 cm long. Label the 6 cm line C and the 15 cm line D.
C
D
a. Line C 2 paper clips Line D 5 paper clips
b. Line D is about 9 cm longer than Line C.
c. Line C is about 3 paper clips shorter than Line D.
d. Lines C and D together are about 7 paper clips long.
e. Lines C and D together are about 21 centimeters long.
15 + 6 = 21
5 1
4. Christina measured Line F with quarters and Line G with pennies.
Line F
Line G
Line F is about 6 quarters long. Line G is about 8 pennies long. Christina said Line G is longer because 8 is a bigger number than 6.
Explain why Christina is incorrect.
Christina is incorrect because the quarters are bigger than the pennies, so there are not as many of them.

Student Debrief (10 minutes)

Lesson Objective: Measure and compare lengths using standard metric length units and non-standard length units; relate measurement to unit size.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson.

Any combination of the questions below may be used to lead the discussion.

- Turn to your partner and compare your answers to Problems 1 and 2. Which math strategies did you use to determine which line was longer or shorter?
- Look at Problem 4. Turn and talk to your partner about why Christina's answer is incorrect.
- Do you think that paper clips are a reliable measurement tool? Is a ruler a better measurement tool? Why?
- What did you notice about the relationship between the unit of length (e.g., paper clips, centimeters) and the number of units needed to measure the lines? Use comparative words (*bigger, smaller, greater, fewer*) in your response.

Exit Ticket (3 minutes)

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help with assessing students' understanding of the concepts that were presented in today's lesson and planning more effectively for future lessons. The questions may be read aloud to the students. Note: Each student needs 3 small paper clips for homework.

A

Number Correct: _____

Subtraction

1.	3 – 1 =	
2.	13 – 1 =	
3.	23 – 1 =	
4.	53 – 1 =	
5.	4 – 2 =	
6.	14 – 2 =	
7.	24 – 2 =	
8.	64 – 2 =	
9.	4 – 3 =	
10.	14 – 3 =	
11.	24 – 3 =	
12.	74 – 3 =	
13.	6 – 4 =	
14.	16 – 4 =	
15.	26 – 4 =	
16.	96 – 4 =	
17.	7 – 5 =	
18.	17 – 5 =	
19.	27 – 5 =	
20.	47 – 5 =	
21.	43 – 3 =	
22.	87 – 7 =	

23.	8 – 7 =	
24.	18 – 7 =	
25.	58 – 7 =	
26.	62 – 2 =	
27.	9 – 8 =	
28.	19 – 8 =	
29.	29 – 8 =	
30.	69 – 8 =	
31.	7 – 3 =	
32.	17 – 3 =	
33.	77 – 3 =	
34.	59 – 9 =	
35.	9 – 7 =	
36.	19 – 7 =	
37.	89 – 7 =	
38.	99 – 5 =	
39.	78 – 6 =	
40.	58 – 5 =	
41.	39 – 7 =	
42.	28 – 6 =	
43.	49 – 4 =	
44.	67 – 4 =	

B

Number Correct: _____

Improvement: _____

Subtraction

1.	2 – 1 =	
2.	12 – 1 =	
3.	22 – 1 =	
4.	52 – 1 =	
5.	5 – 2 =	
6.	15 – 2 =	
7.	25 – 2 =	
8.	65 – 2 =	
9.	4 – 3 =	
10.	14 – 3 =	
11.	24 – 3 =	
12.	84 – 3 =	
13.	7 – 4 =	
14.	17 – 4 =	
15.	27 – 4 =	
16.	97 – 4 =	
17.	6 – 5 =	
18.	16 – 5 =	
19.	26 – 5 =	
20.	46 – 5 =	
21.	23 – 3 =	
22.	67 – 7 =	

23.	8 – 7 =	
24.	18 – 7 =	
25.	68 – 7 =	
26.	32 – 2 =	
27.	9 – 8 =	
28.	19 – 8 =	
29.	29 – 8 =	
30.	79 – 8 =	
31.	8 – 4 =	
32.	18 – 4 =	
33.	78 – 4 =	
34.	89 – 9 =	
35.	9 – 7 =	
36.	19 – 7 =	
37.	79 – 7 =	
38.	89 – 5 =	
39.	68 – 6 =	
40.	48 – 5 =	
41.	29 – 7 =	
42.	38 – 6 =	
43.	59 – 4 =	
44.	77 – 4 =	

Name _____ Date _____

Measure each set of lines with one small paper clip, using mark and move forward. Measure each set of lines in centimeters using a ruler.

1. Line A _____

   Line B _____

   a. Line A

      _____ paper clips _____ cm

   b. Line B

      _____ paper clips _____ cm

   c. Line B is about _____ paper clips shorter than Line A.

   d. Line A is about _____ cm longer than Line B.

2. _____ Line L

   _____ Line M

   a. Line L

      _____ paper clips _____ cm

   b. Line M

      _____ paper clips _____ cm

   c. Line L is about _____ paper clips longer than Line M.

   d. Line M doubled is about _____ cm shorter than Line L.

3. Draw a line that is 6 cm long and another line below it that is 15 cm long. Label the 6 cm line C and the 15 cm line D.

   a. Line C _____ paper clips

      Line D _____ paper clips

   b. Line D is about _____ cm longer than Line C.

   c. Line C is about _____ paper clips shorter than Line D.

   d. Lines C and D together are about _____ paper clips long.

   e. Lines C and D together are about _____ centimeters long.

4. Christina measured Line F with quarters and Line G with pennies.

Line F

Line G

Line F is about 6 quarters long. Line G is about 8 pennies long. Christina said Line G is longer because 8 is a bigger number than 6.

Explain why Christina is incorrect.

_____

_____

Name _____ Date _____

Measure the lines with small paper clips and then with a centimeter ruler. Then, answer the questions below.

Line 1 _____

Line 2 _____

Line 3 _____

a. Line 1

_____ paper clips _____ cm

b. Line 2

_____ paper clips _____ cm

c. Line 3

_____ paper clips _____ cm

Explain why each measurement required more centimeters than paper clips.

_____

_____

_____

Name _____ Date _____

Use a centimeter ruler and paper clips to measure and compare lengths.

1. _____ Line Z

a. Line Z

_____ paper clips _____ cm

b. Line Z doubled would measure about _____ paper clips or about _____ cm long.

2. _____ Line A

_____ Line B

a. Line A

_____ paper clips _____ cm

b. Line B

_____ paper clips _____ cm

c. Line A is about _____ paper clips longer than Line B.

d. Line B doubled is about _____ cm shorter than Line A.

3. Draw a line that is 9 cm long and another line below it that is 12 cm long.

   Label the 9 cm line F and the 12 cm line G.

   a. Line F _____ paper clips

      Line G _____ paper clips

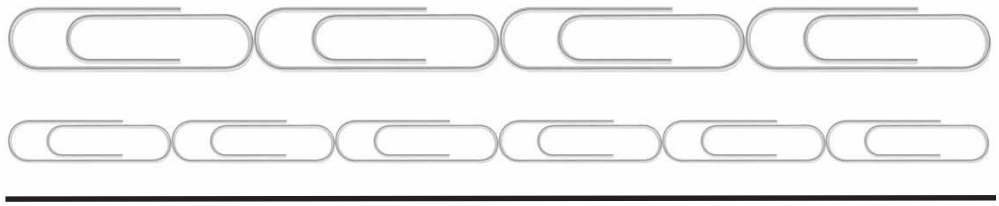
   b. Line G is about _____ cm longer than Line F.

   c. Line F is about _____ paper clips shorter than Line G.

   d. Lines F and G are about _____ paper clips long.

   e. Lines F and G are about _____ centimeters long

4. Jordan measured the length of a line with large paper clips. His friend measured the length of the same line with small paper clips.



   a. About how many paper clips did Jordan use? _____ large paper clips

   b. About how many small paper clips did his friend use? _____ small paper clips

   c. Why did Jordan's friend need more paper clips to measure the same line as Jordan?

      _____

      _____

Topic D

Relate Addition and Subtraction to Length

Focus Standards:	■	Use addition and subtraction within 100 to solve word problems involving lengths that are given in the same units, e.g., by using drawings (such as drawings of rulers) and equations with a symbol for the unknown number to represent the problem.	
	■	Represent whole numbers as lengths from 0 on a number line diagram with equally spaced points corresponding to the numbers 0, 1, 2, …, and represent whole-number sums and differences within 100 on a number line diagram.	
Instructional Days:	3		
Coherence -Links from:		GK–M3	Comparison of Length, Weight, Capacity, and Numbers to 10
		G1–M3	Ordering and Comparing Length Measurements as Numbers
		G1–M6	Place Value, Comparison, Addition and Subtraction to 100
		G2–M7	Problem Solving with Length, Money, and Data
-Links to:		G3–M2	Place Value and Problem Solving with Units of Measure
		G3–M4	Multiplication and Area
		G3–M7	Geometry and Measurement Word Problems

In Topic D, students relate addition and subtraction to length. They apply their conceptual understanding to choose appropriate tools and strategies (e.g., the ruler as a number line, benchmarks for estimation, tape diagrams for comparison) to solve word problems.

Students had their first experience creating and using a ruler as a number line in Topic A. Now, in Lesson 8, students solve addition and subtraction word problems using the ruler as a number line. This concept is reinforced and practiced throughout the module in fluency activities that involve using the meter strip for counting on and counting back and is incorporated into the accompanying Problem Sets. In Lesson 9, students progress from concrete to abstract by creating tape diagrams to represent and compare lengths. Lesson 10 culminates with students solving two-step word problems involving measurement using like units.

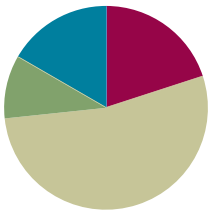
A Teaching Sequence Toward Mastery of Relating Addition and Subtraction to Length	
Objective 1:	**Solve addition and subtraction word problems using the ruler as a number line. (Lesson 8)**
Objective 2:	**Measure lengths of string using measurement tools, and use tape diagrams to represent and compare lengths. (Lesson 9)**
Objective 3:	**Apply conceptual understanding of measurement by solving two-step word problems. (Lesson 10)**

Lesson 8

Objective: Solve addition and subtraction word problems using the ruler as a number line.

Suggested Lesson Structure

Fluency Practice	(12 minutes)
Application Problem	(6 minutes)
Concept Development	(32 minutes)
Student Debrief	(10 minutes)
Total Time	**(60 minutes)**



Fluency Practice (12 minutes)

- How Many More to Make a Meter? (3 minutes)
- Sprint: Making a Meter (9 minutes)

How Many More to Make a Meter? (3 minutes)

Note: This activity extends upon the make a ten strategy within the metric system in preparation for the Sprint. It also reinforces that 1 meter is composed of 100 centimeters.

T: For every number of centimeters I say, you say the number needed to make a meter. If I say 70 centimeters, you say 30 centimeters. Ready?
T: 70 centimeters.
S: 30 centimeters.
T: Number sentence.
S: 70 cm + 30 cm = 1 m.
T: 40 centimeters.
S: 60 centimeters.
T: Number sentence.
S: 40 cm + 60 cm = 1 m.

Continue with the following possible sequence: 20 cm, 90 cm, 10 cm, 9 cm, 11 cm, 50 cm, 49 cm, and 51 cm.

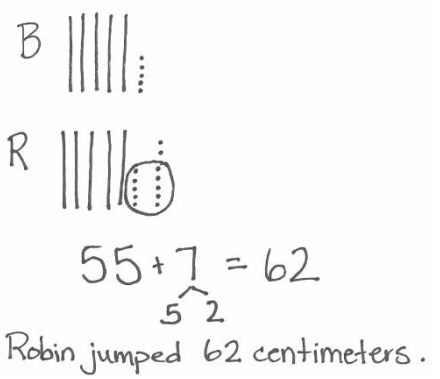
Sprint: Making a Meter (9 minutes)

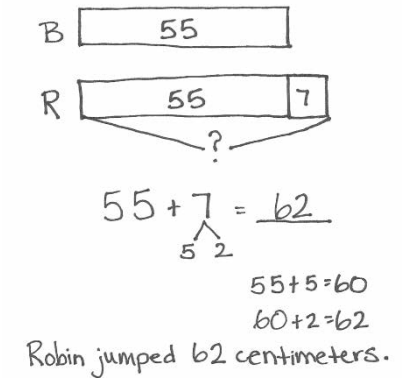
Materials: (S) Making a Meter Sprint

Note: Students use the make a ten strategy to compose 1 meter.

Application Problem (6 minutes)

Bill the frog jumped 7 centimeters less than Robin the frog. Bill jumped 55 centimeters. How far did Robin jump?





Note: This *compare with bigger unknown* problem uses the word *less*, which presents an opportunity for students to work through the easy mistake that *less* or *less than* means to subtract. Ask guiding questions such as, who jumped farther? This, along with a tape diagram, helps students recognize that Robin jumped farther and helps them determine the operation, addition.

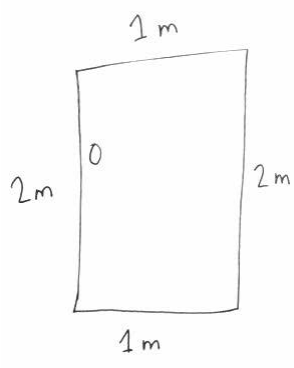
Concept Development (32 minutes)

Materials: (T) 1 piece of 12" × 18" construction paper, torn meter strip (Lesson 6 Template) (S) Meter strip (Lesson 6 Template), 1 piece of 12" × 18" construction paper, personal white board, 25 cm of string

T: I am throwing a party and want to decorate my house. I will start with my front door and put some ribbon around its edges. How can we figure out how long the ribbon should be?

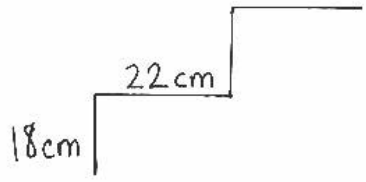
S: Figure out the length around the door using benchmarks like the height of the knob. → Measure around the door with a meter stick and make the ribbon the same length.

T: That is what I did. I used a meter stick to find the measurements. (Draw the door and label each side. The top is 1 meter, the left side is 2 meters, the bottom is 1 meter, and the right side is 2 meters.) How long does the ribbon need to be to go all the way around my door? Share with a partner.



S: 6 m. → I added all four sides and got 6 meters. → I added 2 + 2 + 1 + 1 = 6.

T: I also want to string lights up one side of the steps leading to my front door. Help me figure out the length of the string of lights if they line the edges of the steps.



T: There are two steps. (Draw and label the diagram as shown above.) How many centimeters of lights do I need to line the entire length of both steps? Put your finger on 0 on your meter strip. Slide your finger up to 18 centimeters.

T: To add 22 centimeters, we can think of this meter strip like a **number line**. To make a ten, what part of 22 should we add to 18 first?

S: 2 centimeters.

T: Yes! Slide your finger up 2 more. Where are we on the number line?

S: We are at 20 centimeters.

T: How many more centimeters do we need to slide our finger on the number line?

S: 20 centimeters.

T: Where will our finger stop?

S: At 40 centimeters.

T: Where will we be on the meter strip when we add the second stair? How do you know?

S: We'll be at 80 centimeters, because you need to add 18 + 22 again. → We'll be at 80 centimeters. You just have to double 40 centimeters.

T: I have a string of lights that is 1 meter long. Is it long enough to reach the top of the steps?

S: Yes, because a meter is longer than 80 centimeters. → Yes, because 1 meter is 100 centimeters, and you only need 80 centimeters. → 100 cm – 80 cm = 20 cm left over.

NOTES ON MULTIPLE MEANS OF ACTION AND EXPRESSION:

Get students up and moving by using a number line floor mat to illustrate the idea of moving the zero point.

- Invite a student to begin at 4 and jump 25 length units. Students can count on chorally, starting at 4. Encourage them to add 1 to make 5, then count up by tens.
- Ask, "Do you notice a relationship between 0, 4, 25, 29?"

T: I also want to hang a party sign with this piece of string. I want to know the length of the string, but I tore my meter strip, and now it starts at 4 centimeters. (Show torn meter strip.) Can I still use it to measure?

S: Yes. Count the number of length units. → Line the object up and measure from 4 centimeters to the end of the object, then subtract 4 centimeters.

T: Yes! (Guide students to tear their meter strip at 4 centimeters.) Let's try that. Line up your string with the torn meter strip. Where does the string end?

S: At 29 centimeters.

T: Now, let's take away 4 centimeters from 29 centimeters. What is the length of the string?

S: The string is 25 centimeters long.

T: Yes! I also ordered a cake, which is the same size as this piece of construction paper. The table I want to put it on is the same size as your desks. Can you figure out the length of the cake and the desk to see how much extra space there will be?

T: With your partner, measure the length of the cake and desk, and then find the difference. Record your answers on your personal white boards.

Students measure and return to the carpet to share their answers.

T: What strategy did you and your partner use to measure the lengths with the torn meter strip?

S: We started at the beginning of our meter strip and counted on. → We lined up the meter strip with the lengths and subtracted 4 centimeters from where the object stopped.

T: What is the difference between the length of the table and the length of the cake? (For this example, assume the cake is 45 centimeters and the desk is 60 centimeters.) Give a complete number sentence.

S: 60 cm – 45 cm = 15 cm.
→ 45 cm + 15 cm = 60 cm.

T: So, we know we have 15 centimeters next to the cake. I'm going to put the cake at the bottom of the table. Let's repeat the process to see how much space we will have above it. Measure the width of the cake and table and find the difference.

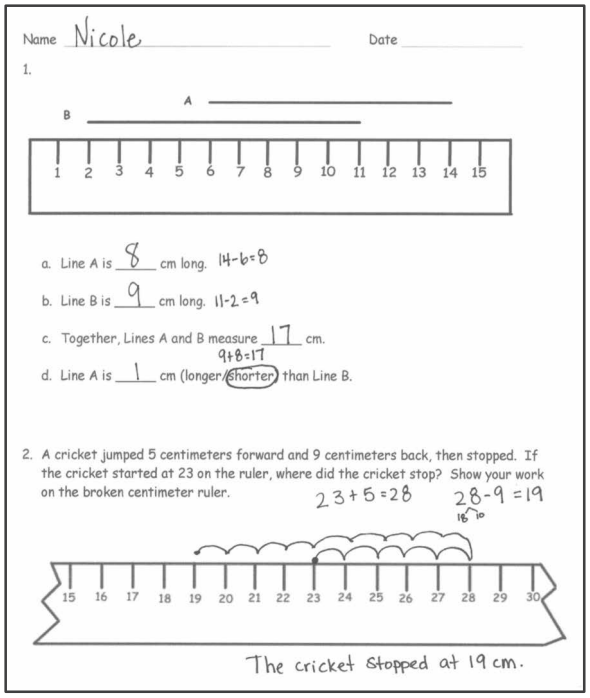
If necessary, repeat the above process with a few more examples:

- Students measure an envelope and an invitation (index card) to see if the envelopes are the right size.
- Students measure 80 centimeters of streamer to see if it will fit across the width of the door, the width of the door being about a meter.

Otherwise, invite students to begin the Problem Set.

Problem Set (10 minutes)

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. For some classes, it may be appropriate to modify the assignment by specifying which problems they work on first. Some problems do not specify a method for solving. Students should solve these problems using the RDW approach used for Application Problems.


Name Nicole Date

1.

a. Line A is 8 cm long. 14-6=8

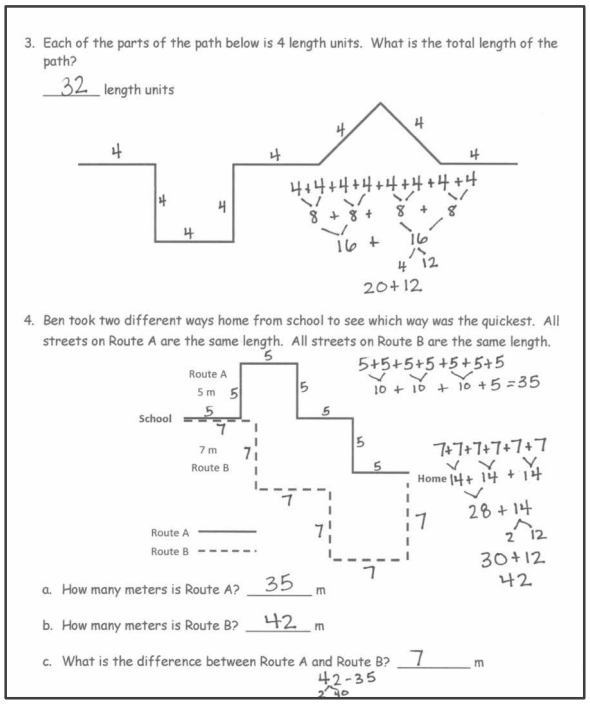
b. Line B is 9 cm long. 11-2=9

c. Together, Lines A and B measure 17 cm. 9+8=17

d. Line A is 1 cm (longer/shorter) than Line B.

2. A cricket jumped 5 centimeters forward and 9 centimeters back, then stopped. If the cricket started at 23 on the ruler, where did the cricket stop? Show your work on the broken centimeter ruler. 23+5=28 28-9=19

The cricket stopped at 19 cm.


3. Each of the parts of the path below is 4 length units. What is the total length of the path?

32 length units

4+4+4+4+4+4+4+4
8 + 8 + 8 + 8
16 + 16
20+12

4. Ben took two different ways home from school to see which way was the quickest. All streets on Route A are the same length. All streets on Route B are the same length.

5+5+5+5+5+5+5
10 + 10 + 10 + 5 = 35

7+7+7+7+7
14 + 14 + 14
28 + 14
30+12
42

a. How many meters is Route A? 35 m

b. How many meters is Route B? 42 m

c. What is the difference between Route A and Route B? 7 m
42-35

Student Debrief (10 minutes)

Lesson Objective: Solve addition and subtraction word problems using the ruler as a number line.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson.

Any combination of the questions below may be used to lead the discussion.

- Explain to your partner how you solved Problem 1. What similarities or differences were there in your solution methods?
- What strategies did you use to solve Problem 2? Invite students to compare their drawings.
- How can you solve a problem with a ruler that does not start at zero?
- How is a ruler similar to a **number line**?
- Look at Problem 4. What math strategies did you need to know in order to solve this problem? (Counting on, skip counting, adding, and subtracting.)
- How did we use addition and subtraction today?

NOTES ON MULTIPLE MEANS OF REPRESENTATION:

Invite students to come forward and model differing solution methods for Problem 4(c) on the class board.

Did anyone arrive at the same solution but in a different way? Can you explain how you solved it?

Exit Ticket (3 minutes)

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help with assessing students' understanding of the concepts that were presented in today's lesson and planning more effectively for future lessons. The questions may be read aloud to the students.

A

Number Correct: _____

Making a Meter

1.	10 cm + ____ = 100 cm	
2.	30 cm + ____ = 100 cm	
3.	50 cm + ____ = 100 cm	
4.	70 cm + ____ = 100 cm	
5.	90 cm + ____ = 100 cm	
6.	80 cm + ____ = 100 cm	
7.	60 cm + ____ = 100 cm	
8.	40 cm + ____ = 100 cm	
9.	20 cm + ____ = 100 cm	
10.	21 cm + ____ = 100 cm	
11.	23 cm + ____ = 100 cm	
12.	25 cm + ____ = 100 cm	
13.	27 cm + ____ = 100 cm	
14.	37 cm + ____ = 100 cm	
15.	38 cm + ____ = 100 cm	
16.	39 cm + ____ = 100 cm	
17.	49 cm + ____ = 100 cm	
18.	50 cm + ____ = 100 cm	
19.	52 cm + ____ = 100 cm	
20.	56 cm + ____ = 100 cm	
21.	58 cm + ____ = 100 cm	
22.	62 cm + ____ = 100 cm	

23.	____ + 62 cm = 1 m	
24.	____ + 72 cm = 1 m	
25.	____ + 92 cm = 1 m	
26.	____ + 29 cm = 1 m	
27.	____ + 39 cm = 1 m	
28.	____ + 59 cm = 1 m	
29.	____ + 89 cm = 1 m	
30.	____ + 88 cm = 1 m	
31.	____ + 68 cm = 1 m	
32.	____ + 18 cm = 1 m	
33.	____ + 15 cm = 1 m	
34.	____ + 55 cm = 1 m	
35.	44 cm + ____ = 1 m	
36.	55 cm + ____ = 1 m	
37.	88 cm + ____ = 1 m	
38.	1 m = ____ + 33 cm	
39.	1 m = ____ + 66 cm	
40.	1 m = ____ + 99 cm	
41.	1 m – 11 cm = ____	
42.	1 m – 15 cm = ____	
43.	1 m – 17 cm = ____	
44.	1 m – 19 cm = ____	

B

Number Correct: _____

Improvement: _____

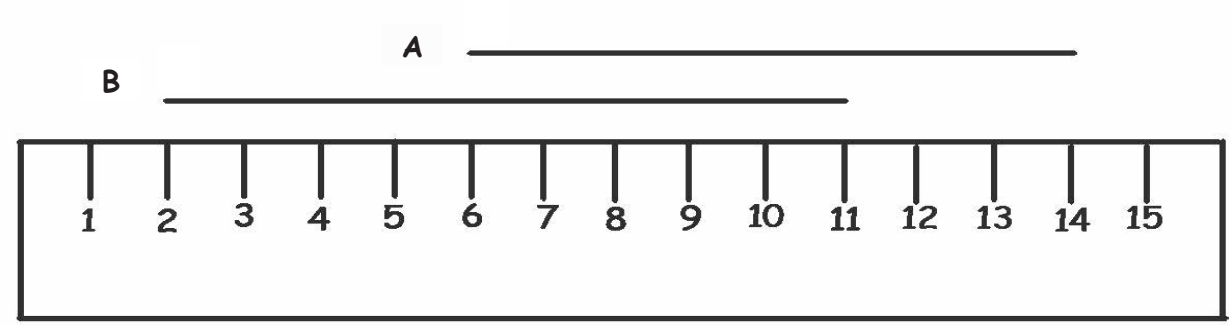
Making a Meter

1.	1 cm + ____ = 100 cm	
2.	10 cm + ____ = 100 cm	
3.	20 cm + ____ = 100 cm	
4.	40 cm + ____ = 100 cm	
5.	60 cm + ____ = 100 cm	
6.	80 cm + ____ = 100 cm	
7.	90 cm + ____ = 100 cm	
8.	70 cm + ____ = 100 cm	
9.	50 cm + ____ = 100 cm	
10.	30 cm + ____ = 100 cm	
11.	31 cm + ____ = 100 cm	
12.	33 cm + ____ = 100 cm	
13.	35 cm + ____ = 100 cm	
14.	37 cm + ____ = 100 cm	
15.	39 cm + ____ = 100 cm	
16.	49 cm + ____ = 100 cm	
17.	59 cm + ____ = 100 cm	
18.	60 cm + ____ = 100 cm	
19.	62 cm + ____ = 100 cm	
20.	66 cm + ____ = 100 cm	
21.	68 cm + ____ = 100 cm	
22.	72 cm + ____ = 100 cm	

23.	____ + 72 cm = 1 m	
24.	____ + 82 cm = 1 m	
25.	____ + 28 cm = 1 m	
26.	____ + 38 cm = 1 m	
27.	____ + 48 cm = 1 m	
28.	____ + 45 cm = 1 m	
29.	____ + 43 cm = 1 m	
30.	____ + 34 cm = 1 m	
31.	____ + 24 cm = 1 m	
32.	____ + 14 cm = 1 m	
33.	____ + 12 cm = 1 m	
34.	____ + 10 cm = 1 m	
35.	11 cm + ____ = 1 m	
36.	33 cm + ____ = 1 m	
37.	55 cm + ____ = 1 m	
38.	1 m = ____ + 22 cm	
39.	1 m = ____ + 88 cm	
40.	1 m = ____ + 99 cm	
41.	1 m – 1 cm = ____	
42.	1 m – 5 cm = ____	
43.	1 m – 7 cm = ____	
44.	1 m – 17 cm = ____	

Name _____ Date _____

1.



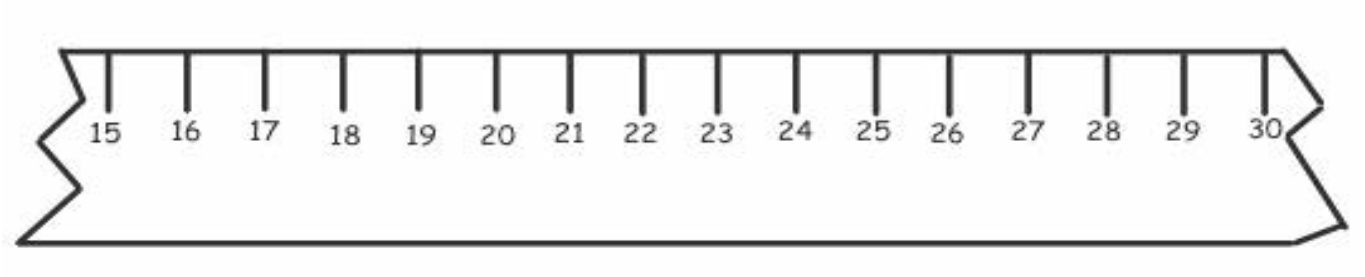
a. Line A is _____ cm long.

b. Line B is _____ cm long.

c. Together, Lines A and B measure _____ cm.

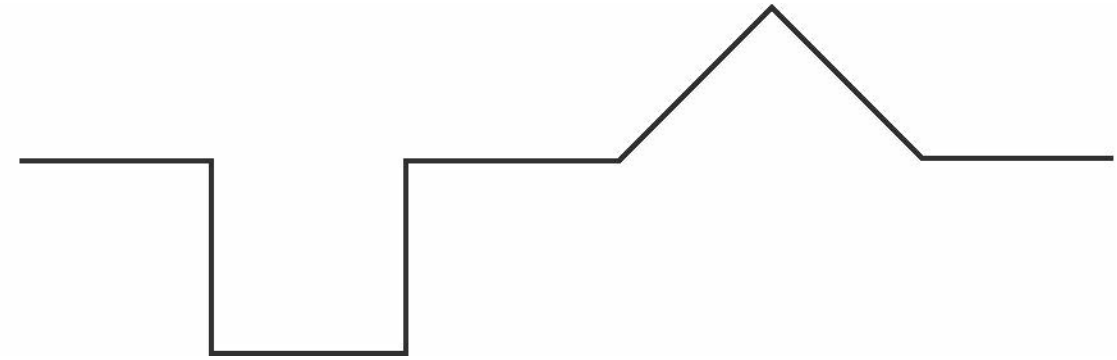
d. Line A is _____ cm (longer/shorter) than Line B.

2. A cricket jumped 5 centimeters forward and 9 centimeters back, and then stopped. If the cricket started at 23 on the ruler, where did the cricket stop? Show your work on the broken centimeter ruler.

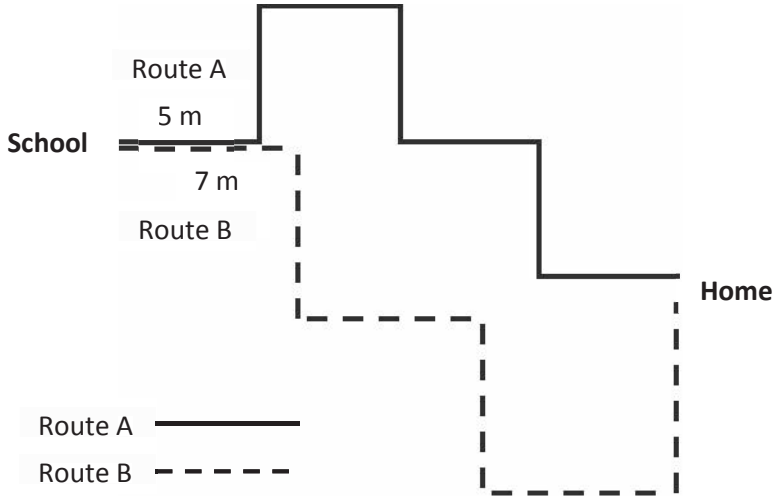


3. Each of the parts of the path below is 4 length units. What is the total length of the path?

_____ length units



4. Ben took two different ways home from school to see which way was the quickest. All streets on Route A are the same length. All streets on Route B are the same length.



a. How many meters is Route A? _____ m

b. How many meters is Route B? _____ m

c. What is the difference between Route A and Route B? _____ m

Name _____ Date _____

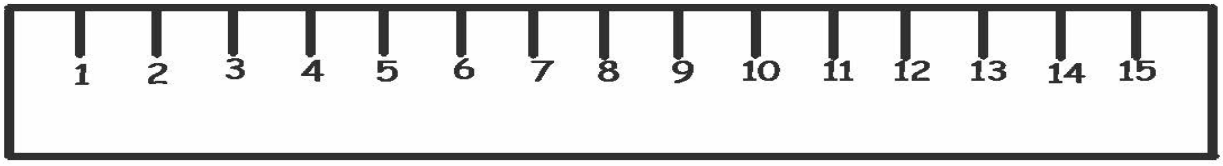
1. Use the ruler below to draw one line that begins at 2 cm and ends at 12 cm. Label that line R. Draw another line that begins at 5 cm and ends at 11 cm. Label that line S.

   a. Add 3 cm to Line R and 4 cm to Line S.

   b. How long is Line R now? _____ cm

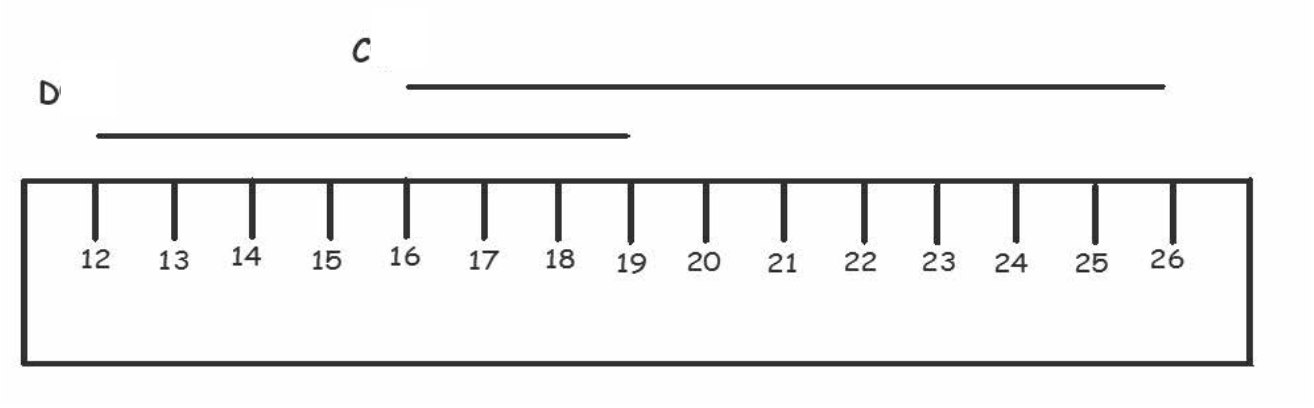
   c. How long is Line S now? _____ cm

   d. The new Line S is _____ cm (shorter/longer) than the new Line R.



Name _____ Date _____

1.



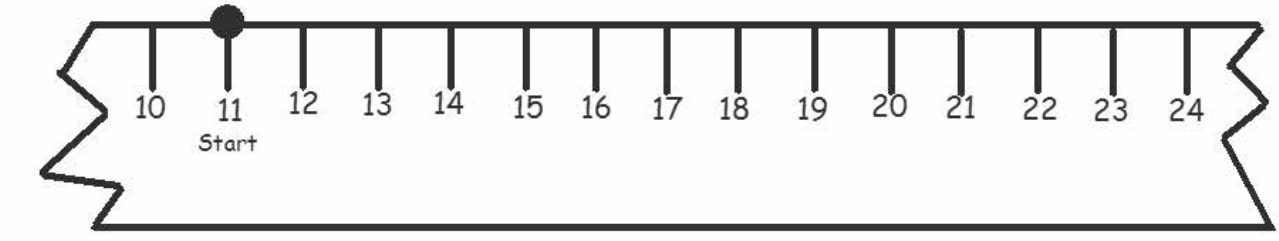
a. Line C is _____ cm.

b. Line D is _____ cm.

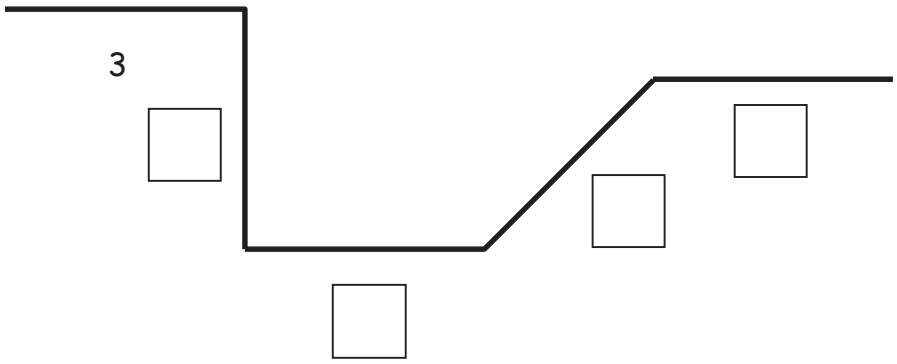
c. Lines C and D are _____ cm.

d. Line C is _____ cm (longer/shorter) than Line D.

2. An ant walked 12 centimeters to the right on the ruler and then turned around and walked 5 centimeters to the left. His starting point is marked on the ruler. Where is the ant now? Show your work on the broken ruler.



3. All of the parts of the path below are equal length units.



a. Fill in the empty boxes with the lengths of each side.

b. The path is _____ length units long.

c. How many more parts would you need to add for the path to be 21 length units long?

_____ parts

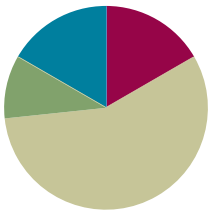
4. The length of a picture is 67 centimeters. The width of the picture is 40 centimeters. How many more centimeters is the length than the width?

Lesson 9

Objective: Measure lengths of string using measurement tools, and use tape diagrams to represent and compare lengths.

Suggested Lesson Structure

Fluency Practice	(10 minutes)
Application Problem	(6 minutes)
Concept Development	(34 minutes)
Student Debrief	(10 minutes)
Total Time	**(60 minutes)**



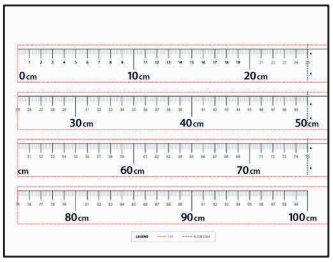
Fluency Practice (10 minutes)

- Meter Strip Addition: Adding Multiples of 10 to Numbers (6 minutes)
- Happy Counting by Centimeters (4 minutes)

Meter Strip Addition: Adding Multiples of 10 to Numbers (6 minutes)

Materials: (S) Meter strip (Lesson 6 Template) (as pictured)

Note: Students apply knowledge of using the ruler as a number line to fluently add multiples of 10. The meter strip solidifies the process for visual and tactile learners and creates the groundwork for students to make tape diagrams in the lesson.



T: (Each student has a meter strip.) Put your finger on 0 to start. I'll say the whole measurement. Slide up to that number. Add 10 centimeters and tell me how many centimeters your finger is from 0.
T: Let's try one. Fingers at 0 centimeters! (Pause.) 30 centimeters.
S: (Slide their fingers to 30.)
T: Remember to add 10. (Pause.) How far is your finger from 0?
S: 40 centimeters.

Continue with the following possible sequence: 45 cm, 51 cm, 63 cm, 76 cm, 87 cm, and 98 cm. As students show mastery, advance to adding 20 centimeters.

Happy Counting by Centimeters (4 minutes)

Note: Students practice counting by 10 centimeters and exchanging centimeters for meters. This activity relates to Say Ten counting, where ones are exchanged for tens. It can be demonstrated on a Rekenrek, with each bead representing 10 centimeters.

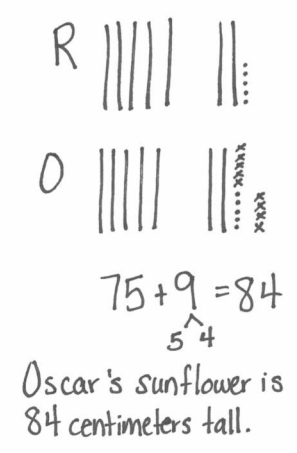
T: Let's count by 10 centimeters, starting at 80 centimeters. When we get to 100 centimeters, we say 1 meter, and then we will count by meters and centimeters. Ready? (Rhythmically point up until a change is desired. Show a closed hand, and then point down. Continue, mixing it up.)

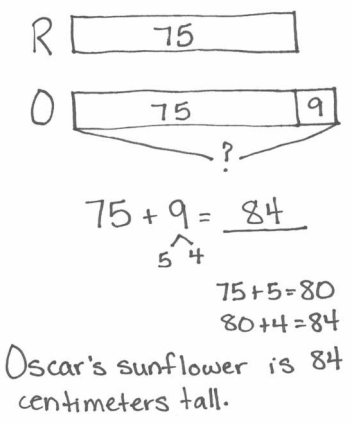
S: 80 cm, 90 cm, 1m, 1m 10 cm, 1 m 20 cm, 1 m 30 cm, 1 m 40 cm, 1 m 50 cm. (Switch direction.) 1 m 40 cm, 1 m 30 cm, 1 m 20 cm. (Switch direction.) 1 m 30 cm, 1 m 40 cm, 1 m 50 cm, 1 m 60 cm, 1 m 70 cm, 1 m 80 cm, 1 m 90 cm, 2 m. (Switch direction.) 1 m 90 cm. (Switch direction.) 2 m, 2 m 10 cm, 2 m 20 cm. (Switch direction.) 2 m 10 cm, 2 m, 1 m 90 cm.

T: Excellent! Try it for 30 seconds with your partner starting at 80 centimeters. Partner B, you are the teacher today.

Application Problem (6 minutes)

Richard's sunflower is 9 centimeters shorter than Oscar's. Richard's sunflower is 75 centimeters tall. How tall is Oscar's sunflower?





This *compare with bigger unknown* problem is similar to the problem in Lesson 8, but here the word "shorter" relates to measurement. This is in anticipation of today's Concept Development, wherein students measure lengths of strings and use tape diagrams to represent and compare lengths.

Concept Development (34 minutes)

Materials: (T) 2 lengths of string in two different colors (3 meters red and 5 meters blue), meter stick, masking tape (S) 1 meter strip, 50 cm piece of string, personal white board

Note: Students take the string and meter strip home to complete the Homework.

T: (Before class begins, use masking tape to make two tape paths on the floor. Make one path that measures 3 meters squiggly and one path that measures 5 meters zigzaggy. Convene students on the carpet, perhaps seated in a U-shape.)

T: Make an estimate. How long is the zigzag path?

S: (Share estimates.)

T: Make an estimate. How long is the squiggly path?

S: (Share estimates.)

T: Which path do you think is longer?

S: (Share thoughts.)

T: I have some string here. How do you think this string could help me to check our estimates?

S: Take some string and put it straight on each path. → Hold it down with one hand and lay it down along the tape.

T: (Use the red string to measure the squiggly path and the blue string to measure the zigzag path.)

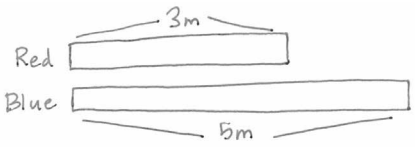
T: Now, I compare the lengths of the paths by measuring these strings. Because the strings are so long, let's tape them on the floor and see how long they are.

T: (Lay the red and blue strings parallel on the floor and horizontal to students.)

T: Use a benchmark to estimate the length of each string. Share your estimates with your neighbor.

T: What measurement tool could we use to check the estimates?

S: A meter tape. → A meter stick.



T: (Call two volunteers to measure.)

S: The red string is 3 meters. The blue string is 5 meters.

T: I don't have enough space on the board to tape these long strings. What could I do instead?

S: Draw a picture. → Write the numbers.

T: (Draw a horizontal rectangular bar to represent the length of the red string.) This represents the red string. Tell me when to stop to show the blue string. (Start at the left end of the red bar and move to the right, making a second bar underneath the first.)

S: Stop!

T: Why should I stop here?

S: Because the second bar should be longer than the first bar.

T: Let's write the measurements of each string above.

T: (Label both bars.) What expression could you use to describe the total length of these strings?

S: 3 + 5.

T: What expression could I use to describe the difference in length between these two strings?

S: 5 – 3.

T: Remember, this is called a tape diagram. It is helpful because we can draw a small picture to represent any length.

T: Let's practice making a tape diagram.

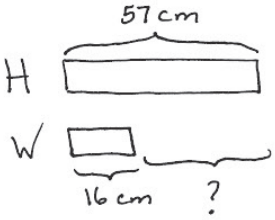
T: What is the measurement around my wrist? (Demonstrate wrapping the string around your wrist and pinching the end point, and then lay the string along a meter stick to determine the length.)

S: 16 centimeters.

T: Let's compare the length around my wrist to the length around my head. What's the length around my head? (Repeat the demonstration process, and record the length on the board.)

S: 57 centimeters.

T: Draw along with me as I draw the first bar on the board to represent my head measurement. We'll label this 57 centimeters.



S: (Draw.)

T: Right below that, draw the second bar to show my wrist measurement. Should the bar be longer or shorter?

S: Shorter. (Draw and label the second bar 16 centimeters.)

T: Look at your diagram. Talk with your neighbor: What is this open space between the end of the first and second bars?

S: It's how much longer 57 centimeters is than 16 centimeters. → It's the difference between 16 centimeters and 57 centimeters. → It's the difference between the measurement of your wrist and your head.

T: How can we find the difference between 16 centimeters and 57 centimeters?

S: 57 – 16 = ___. → 16 + ___ = 57.

Check students' tape diagrams. Have them compare the measurement around their thigh and the length of their arm, and the length around their neck and the length around their head.

Problem Set (10 minutes)

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. For some classes, it may be appropriate to modify the assignment by specifying which problems they work on first. Some problems do not specify a method for solving. Students should solve these problems using the RDW approach used for Application Problems.

Student Debrief (10 minutes)

Lesson Objective: Measure lengths of string using measurement tools, and use tape diagrams to represent and compare lengths.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

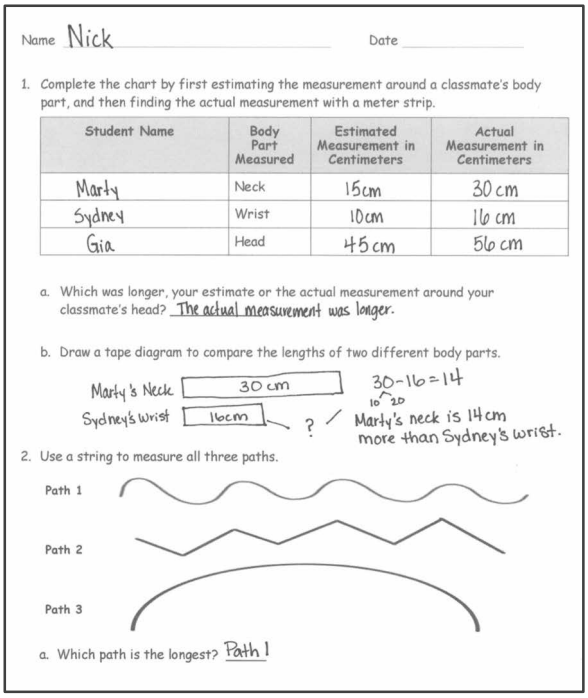
Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson.

Any combination of the questions below may be used to lead the discussion.

- What estimation strategies did you use for Problem 1? How were they similar to or different from your partner's strategies? (Chart benchmark strategies.)
- Look at Problems 2 and 3. What steps did you take to draw an accurate tape diagram? How do your drawings compare to your partner's?
- What do you think the math goal of this lesson was? What would be a good name for this lesson?
- How did you show your thinking today?

Exit Ticket (3 minutes)

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help with assessing students' understanding of the concepts that were presented in today's lesson and planning more effectively for future lessons. The questions may be read aloud to the students.



Name Nick Date

1. Complete the chart by first estimating the measurement around a classmate's body part, and then finding the actual measurement with a meter strip.

Student Name	Body Part Measured	Estimated Measurement in Centimeters	Actual Measurement in Centimeters
Marty	Neck	15cm	30 cm
Sydney	Wrist	10cm	16 cm
Gia	Head	45 cm	56 cm

a. Which was longer, your estimate or the actual measurement around your classmate's head? The actual measurement was longer.

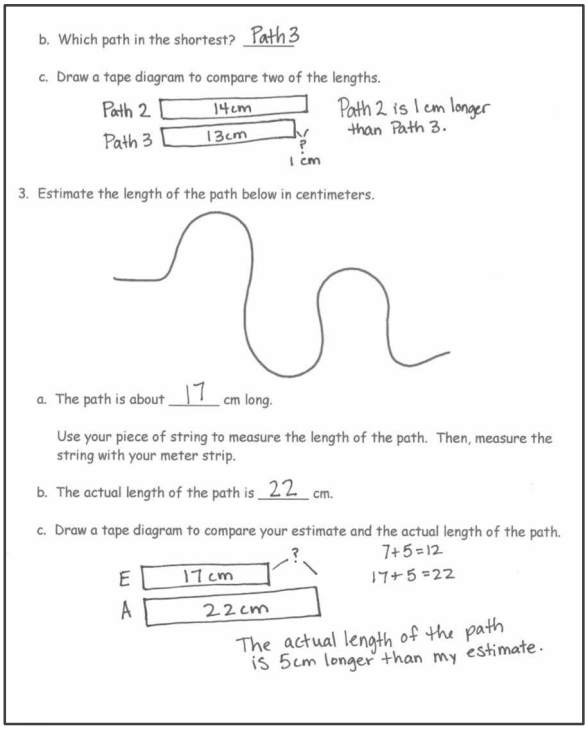
b. Draw a tape diagram to compare the lengths of two different body parts.

Marty's Neck 30 cm
Sydney's wrist 16cm ?
30−16=14
10 20
Marty's neck is 14 cm more than Sydney's wrist.

2. Use a string to measure all three paths.

Path 1
Path 2
Path 3

a. Which path is the longest? Path 1



b. Which path in the shortest? Path 3

c. Draw a tape diagram to compare two of the lengths.

Path 2 14cm
Path 3 13cm
1 cm
Path 2 is 1 cm longer than Path 3.

3. Estimate the length of the path below in centimeters.

a. The path is about 17 cm long.

Use your piece of string to measure the length of the path. Then, measure the string with your meter strip.

b. The actual length of the path is 22 cm.

c. Draw a tape diagram to compare your estimate and the actual length of the path.

E 17 cm
A 22 cm
7+5=12
17+5=22
The actual length of the path is 5cm longer than my estimate.

Name _____ Date _____

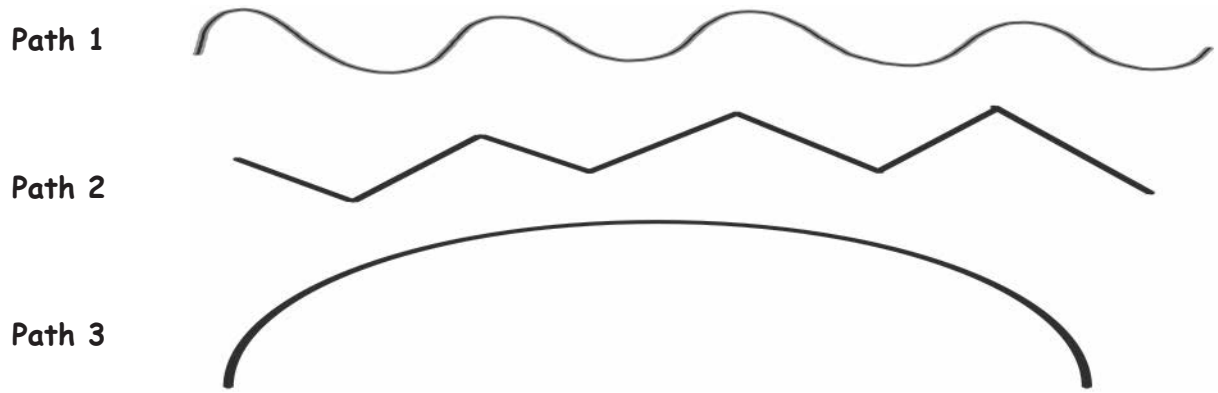
1. Complete the chart by first estimating the measurement around a classmate's body part and then finding the actual measurement with a meter strip.

Student Name	Body Part Measured	Estimated Measurement in Centimeters	Actual Measurement in Centimeters
	Neck		
	Wrist		
	Head		

a. Which was longer, your estimate or the actual measurement around your classmate's head? _____

b. Draw a tape diagram to compare the lengths of two different body parts.

2. Use a string to measure all three paths.

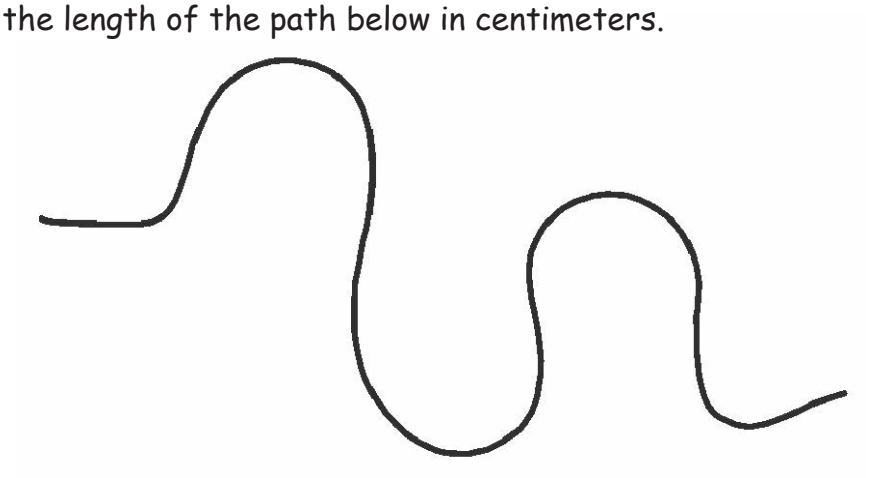


a. Which path is the longest? _____

b. Which path in the shortest? _____

c. Draw a tape diagram to compare two of the lengths.

3. Estimate the length of the path below in centimeters.



a. The path is about _____ cm long.

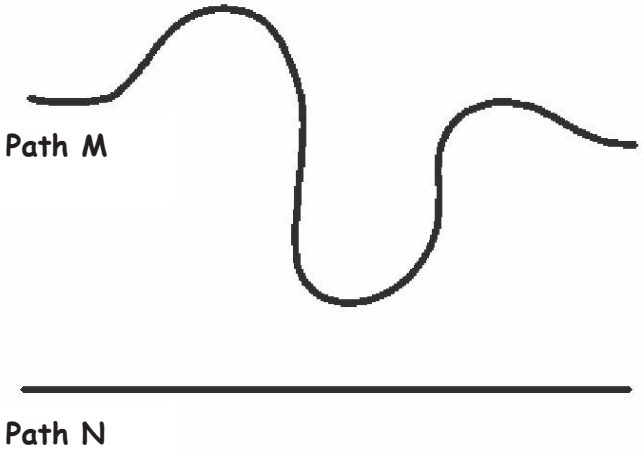
Use your piece of string to measure the length of the path. Then, measure the string with your meter strip.

b. The actual length of the path is _____ cm.

c. Draw a tape diagram to compare your estimate and the actual length of the path.

Name _____ Date _____

1. Use your string to measure the two paths. Write the length in centimeters.



Path M is _____ cm long.

Path N is _____ cm long.

2. Mandy measured the paths and said both paths are the same length. Is Mandy correct? Yes or No? _____

Explain why or why not.

_____

_____

3. Draw a tape diagram to compare the two lengths.

Name _____ Date _____

1. Mia completed the chart by first estimating the measurement around three objects in her house and then finding the actual measurement with her meter strip.

Object Name	Estimated Measurement in Centimeters	Actual Measurement in Centimeters
Orange	40 cm	36 cm
Mini Basketball	30 cm	41 cm
Bottom of a glue bottle	10 cm	8 cm

a. What is the difference between the longest and shortest measurements?

_____ cm

b. Draw a tape diagram comparing the measurements of the orange and the bottom of the glue bottle.

c. Draw a tape diagram comparing the measurements of the basketball and the bottom of the glue bottle.

2. Measure the two paths below with your meter strip and string.

Path A

Path B

a. Path A is _____ cm long.

b. Path B is _____ cm long.

c. Together, Paths A and B measure _____ cm.

d. Path A is _____ cm (shorter/longer) than Path B.

3. Shawn and Steven had a contest to see who could jump farther. Shawn jumped 75 centimeters. Steven jumped 9 more centimeters than Shawn.

a. How far did Steven jump? _____ centimeters

b. Who won the jumping contest? _____

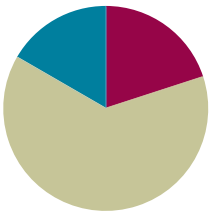
c. Draw a tape diagram to compare the lengths that Shawn and Steven jump.

Lesson 10

Objective: Apply conceptual understanding of measurement by solving two-step word problems.

Suggested Lesson Structure

Fluency Practice	(12 minutes)
Concept Development	(38 minutes)
Student Debrief	(10 minutes)
Total Time	**(60 minutes)**



Fluency Practice (12 minutes)

- Meter Strip Subtraction: Subtracting Multiples of 10 from Numbers (6 minutes)
- Take from Ten (3 minutes)
- Relate Subtraction to Addition (3 minutes)

Meter Strip Subtraction: Subtracting Multiples of 10 from Numbers (6 minutes)

Materials: (S) Meter strips (Lesson 6 Template)

Note: Students fluently subtract multiples of 10 while using the ruler as a number line.

T: Put your finger on 0 to start. I'll say the whole measurement. Slide up to that number. Then, take away 10 centimeters and tell me how many centimeters your finger is from 0.
T: Fingers at 0 centimeters! (Pause.) 30 centimeters.
S: (Slide their fingers to 30.)
T: Remember to take 10. (Pause.) How far is your finger from 0?
S: 20 centimeters.

Continue with the following possible sequence: 45 cm, 52 cm, 64 cm, 74 cm, 82 cm, 91 cm, and 99 cm. As students show mastery, advance to subtracting 20 centimeters.

Take from Ten (3 minutes)

Note: Students explore an alternate method of using ten to subtract in preparation of subtracting throughout the year. Draw a number bond for the first example to model student thinking to solve.

T: For every number sentence I say, you will give a subtraction number sentence that takes from the ten first. When I say 12 – 3, you say 12 – 2 – 1. Ready?

(Draw on board)

12 – 3 =___

/

2 1

T: 12 – 3.

S: 12 – 2 – 1.

T: Answer.

S: 9.

Continue with the following possible sequence: 12 – 4, 12 – 5, 14 – 5, 14 – 6, 14 – 7, 15 – 7, 15 – 8, 15 – 9, 16 – 9, and 16 – 8.

Relate Subtraction to Addition (3 minutes)

Note: This activity challenges students to mentally subtract the ones and add the difference to 10. Draw a number bond for the first example to support student answers. (Students may answer verbally or on their personal white board.)

T: 2 – 1.

S: 1.

T: When I say 12 – 1, you say 10 + 1. Ready? 12 – 1.

S: 10 + 1.

T: 3 – 1.

S: 2.

(Draw on board)

12 – 1 =____

/

10 2

T: 13 – 1.

S: 10 + 1.

T: Answer.

S: 12.

Continue with the following possible sequence: 14 – 1, 15 – 1, 16 – 1, 17 – 1, 17 – 2, 17 – 4, 16 – 4, 15 – 4, 15 – 2, and 14 – 2.

NOTES ON MULTIPLE MEANS OF REPRESENTATION:

Students who are struggling with pictorial representations may need to use concrete models (e.g., linking cubes) to demonstrate conceptual understanding of addition and subtraction. Incremented bars can be added to the tape diagram as a transition from base ten blocks to a pictorial model, as well.

Concept Development (38 minutes)

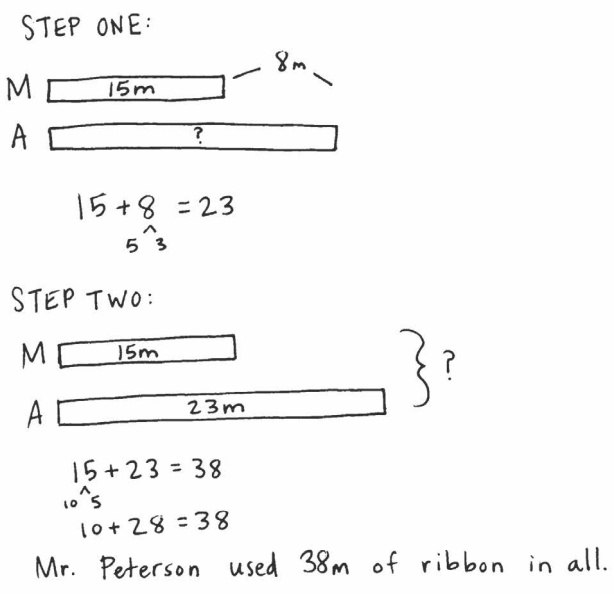
Materials: (S) Personal white board

Post the two problems on the board. Under each problem make two sections labeled Step 1 and Step 2. Cover the second problem until that portion of the Concept Development.

Problem 1

Mr. Peterson decorated with 15 meters of ribbon in the morning. He decorated with 8 more meters in the afternoon than in the morning. How many meters of ribbon did Mr. Peterson use to decorate in the morning and afternoon in all?

T: Let's read Problem 1 together.
S/T: (Read Problem 1 chorally.)
T: (Draw a bar on the board under Step 1 and label it M for morning.)
T: How many meters of ribbon did Mr. Peterson use to decorate in the morning?
S: 15 meters.
T: (Label the bar 15 m.) When did he decorate again?
S: In the afternoon.
T: Did he use more or less ribbon in the afternoon?
S: More!
T: How many more meters?
S: 8 more meters.
T: Tell me when to stop drawing. (Start to draw a second bar under the first bar to represent the afternoon meters.)
S: Stop!
T: (Label this bar A for afternoon.) What is this measurement here, the difference between his ribbon in the morning and afternoon?
S: 8 meters.
T: (Label 8 m.) What are we trying to find?
S: How many meters of ribbon he used in the morning and afternoon.
T: Where do we put our question mark?
T: In the second bar. → In the bar labeled A.
T: Look at the tape diagram. In Step 1, are we looking for a missing part or the whole?
S: The whole.
T: Raise your hand when you know the length of ribbon used in the afternoon. Give the number sentence, starting with 15.



S: 15 + 8 = 23.

T: What do we still need to find out?

S: How many meters did he use in the morning *and* in the afternoon.

T: This is Step 2. (Redraw the same model with the 23 meters recorded and the question mark to the right as shown in Step 2 above.)

T: How many meters in the morning and afternoon did Mr. Peterson use to decorate? Turn and talk.

S: 38 because 15 and 23 makes 38. → 10 + 20 = 30, and 5 + 3 = 8, 30 + 8 = 38.

T: (Record different solution strategies. Cross out the question mark and write 38 to show the solution.) You just solved Step 2.

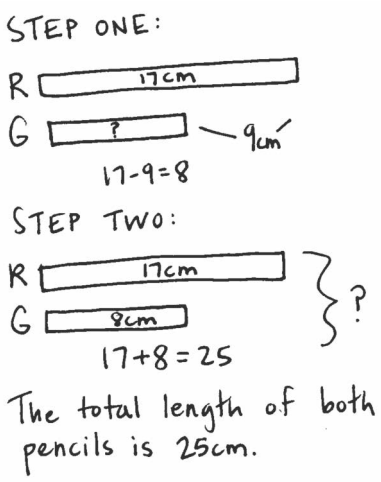
T: Remember, we also have to write our answer in a word sentence. How many meters of ribbon did Mr. Peterson use in all?

S: He used 38 meters of ribbon in all.

T: (Record the statement.)

Problem 2

The red colored pencil is 17 centimeters long. The green colored pencil is 9 centimeters shorter than the red colored pencil. What is the total length of both pencils?



Lead students through a similar process to that of Problem 1. Work the problem with them.

Step 1: Model and label the length of the red pencil, the difference in the lengths of the pencils, and the question mark. Find the length of the green pencil. Write a number sentence.

Step 2: Redraw the model with 8 centimeters labeled in the lower bar and the unknown marked to the right with a question mark and bracket. Find the total of both lengths. Write a number sentence and statement of the solution.

Once having completed both problems, have students compare Problems 1 and 2.

Problem Set (10 minutes)

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. For some classes, it may be appropriate to modify the assignment by specifying which problems they work on first. Some problems do not specify a method for solving. Students should solve these problems using the RDW approach used for Application Problems.

NOTES ON MULTIPLE MEANS OF ENGAGEMENT:

While students are completing the Problem Set, check frequently for understanding by saying, "Show me," with concrete models or tape diagrams. Modify two-step word problems so that they only involve single-digit addends. Assign struggling students to a buddy to clarify processes.

Student Debrief (10 minutes)

Lesson Objective: Apply conceptual understanding of measurement by solving two-step word problems.

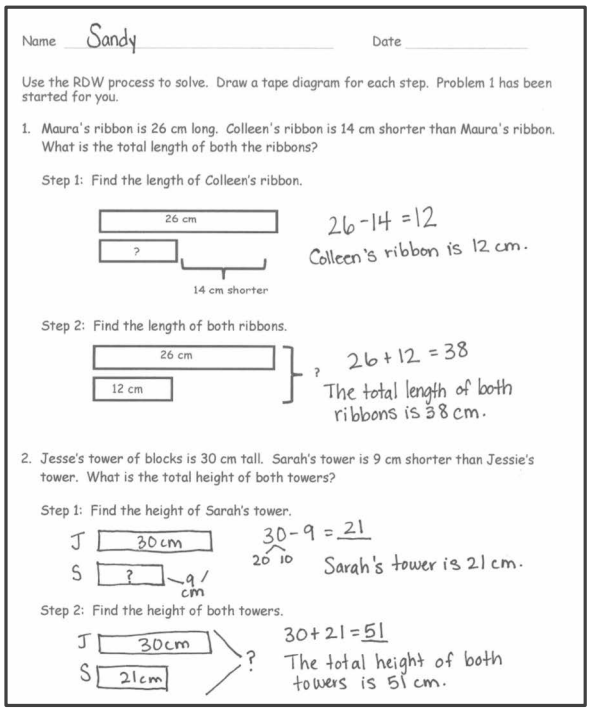
The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson.

Any combination of the questions below may be used to lead the discussion.

- How was your drawing for Problem 2, Step 1, similar to the model drawn for Problem 1, Step 1?
- With your partner, compare your tape diagrams for Problem 2, Step 2. How did you label them?

  Where did you place your addends? How did you show the change (smaller, taller)? Where did you draw brackets?
- What must you do when drawing tape diagrams and comparing lengths in order to be accurate?
- How could we arrive at the same answer to today's problems but in a different way? What other math strategies can you connect with this (e.g., part–whole, number bond figures)?
- How do tape diagrams help you to solve problems with more than one step?


Name Sandy Date

Use the RDW process to solve. Draw a tape diagram for each step. Problem 1 has been started for you.

1. Maura's ribbon is 26 cm long. Colleen's ribbon is 14 cm shorter than Maura's ribbon. What is the total length of both the ribbons?

Step 1: Find the length of Colleen's ribbon.

26 cm
?
14 cm shorter

26 − 14 = 12
Colleen's ribbon is 12 cm.

Step 2: Find the length of both ribbons.

26 cm
12 cm
?

26 + 12 = 38
The total length of both ribbons is 38 cm.

2. Jesse's tower of blocks is 30 cm tall. Sarah's tower is 9 cm shorter than Jessie's tower. What is the total height of both towers?

Step 1: Find the height of Sarah's tower.

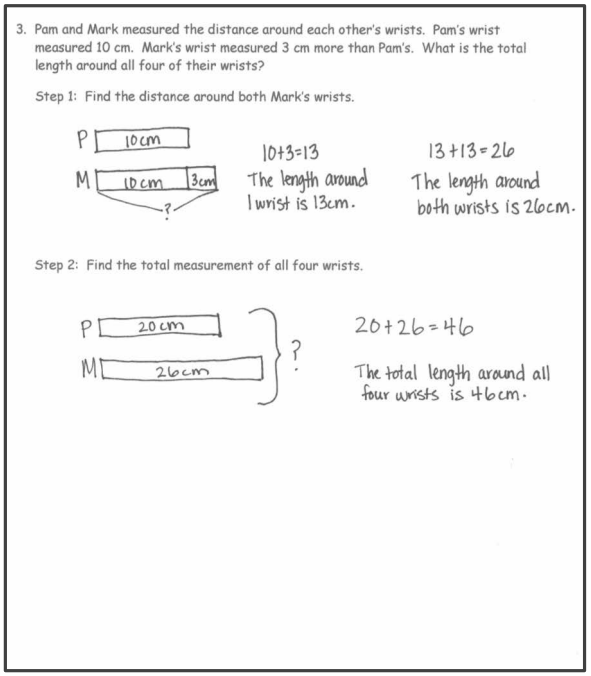
J 30 cm
S ? 9 cm

30 − 9 = 21
20 10
Sarah's tower is 21 cm.

Step 2: Find the height of both towers.

J 30 cm
S 21 cm
?

30 + 21 = 51
The total height of both towers is 51 cm.


3. Pam and Mark measured the distance around each other's wrists. Pam's wrist measured 10 cm. Mark's wrist measured 3 cm more than Pam's. What is the total length around all four of their wrists?

Step 1: Find the distance around both Mark's wrists.

P 10 cm
M 10 cm 3 cm
?

10 + 3 = 13
The length around 1 wrist is 13 cm.

13 + 13 = 26
The length around both wrists is 26 cm.

Step 2: Find the total measurement of all four wrists.

P 20 cm
M 26 cm
?

20 + 26 = 46
The total length around all four wrists is 46 cm.

Exit Ticket (3 minutes)

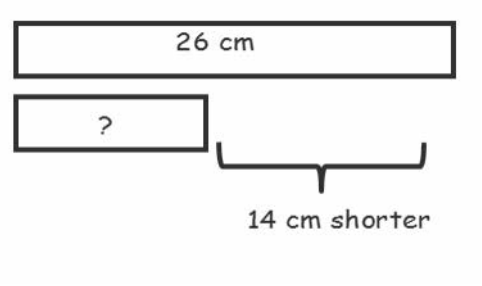
After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help with assessing students' understanding of the concepts that were presented in today's lesson and planning more effectively for future lessons. The questions may be read aloud to the students.

Name _____ Date _____

Use the RDW process to solve. Draw a tape diagram for each step. Problem 1 has been started for you.

1. Maura's ribbon is 26 cm long. Colleen's ribbon is 14 cm shorter than Maura's ribbon. What is the total length of both ribbons?

   Step 1: Find the length of Colleen's ribbon.



   Step 2: Find the length of both ribbons.

2. Jesse's tower of blocks is 30 cm tall. Sarah's tower is 9 cm shorter than Jessie's tower. What is the total height of both towers?

   Step 1: Find the height of Sarah's tower.

   Step 2: Find the height of both towers.

3. Pam and Mark measured the distance around each other's wrists. Pam's wrist measured 10 cm. Mark's wrist measured 3 cm more than Pam's. What is the total length around all four of their wrists?

   Step 1: Find the distance around both Mark's wrists.

   Step 2: Find the total measurement of all four wrists.

Name _____ Date _____

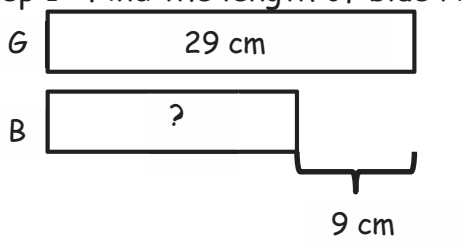
Steven has a black leather strip that is 13 centimeters long. He cut off 5 centimeters. His teacher gave him a brown leather strip that is 16 centimeters long. What is the total length of both strips?

Name _____ Date _____

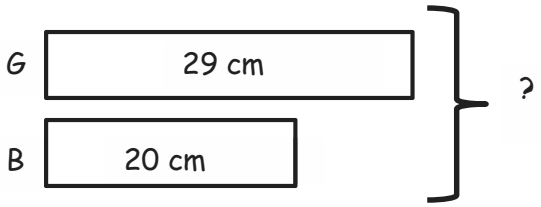
Use the RDW process to solve. Draw a tape diagram for each step. Problem 1 has been started for you.

1. There is 29 cm of green ribbon. A blue ribbon is 9 cm shorter than the green ribbon. How long is the blue ribbon?

   Step 1: Find the length of blue ribbon.



   Step 2: Find the length of both the blue and green ribbons.



2. Joanna and Lisa drew lines. Joanna's line is 41 cm long. Lisa's line is 19 cm longer than Joanna's. How long are Joanna's and Lisa's lines?

   Step 1: Find the length of Lisa's line.

   Step 2: Find the total length of their lines.

Name _____ Date _____

Note: Students need a centimeter ruler and 6 small paper clips to complete the assessment.

1. Use your ruler to find the length of the pencil and the crayon.

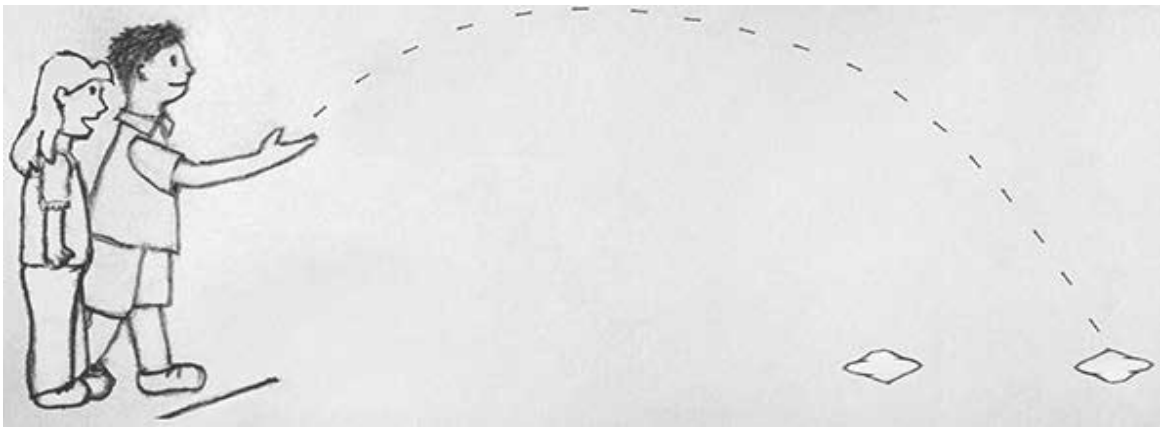
a. How long is the crayon? _____ centimeters

b. How long is the pencil? _____ centimeters

c. Which is longer? pencil crayon

d. How much longer? _____ centimeters

2. Samantha and Bill are having a beanbag throwing contest and need to measure each of their throws.



a. Circle the most appropriate tool to measure their throws.

ruler paper clips meter stick centimeter cubes

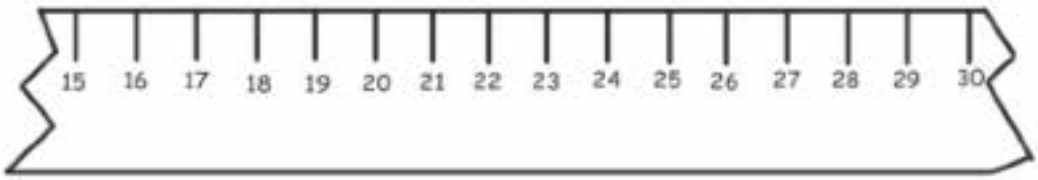
b. Explain your choice using pictures or words.

c. Bill throws his beanbag 5 meters, which is 2 meters farther than Samantha threw her beanbag. How far did Samantha throw her beanbag? Draw a diagram or picture to show the length of their throws.

d. Sarah threw her beanbag 3 meters farther than Bill. Who won the contest? How do you know?

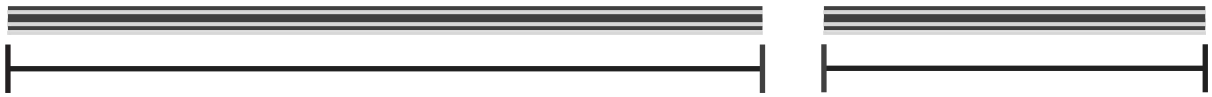
3. Use the broken centimeter ruler to solve the problem.

   A grasshopper jumped 7 centimeters forward and 4 centimeters back and then stopped. If the grasshopper started at 18, where did the grasshopper stop? Show your work.



4.

Vanessa's Ribbons



Ribbon A *Ribbon B*

   a. Measure the length of Ribbon A with your centimeter ruler and your paper clip. Write the measurements on the lines below.

      _____ centimeters _____ paper clips

   b. Explain why the number of centimeters is larger than the number of paper clips. Use pictures or words.

c. Estimate the length of Ribbon B in paper clips.

_____ paper clips

d. How much longer is Ribbon A than Ribbon B? Give your answer in centimeters.

e. Vanessa is using the ribbons to wrap a gift. If she tapes the ribbons together with no overlap, how many centimeters of ribbon does she have altogether?

f. If Vanessa needs 20 centimeters of ribbon, how much more does she need?

End-of-Module Assessment Task Standards Addressed	Topics A–D

Measure and estimate lengths in standard units.

- Measure the length of an object by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes.
- Measure the length of an object twice, using length units of different lengths for the two measurements; describe how the two measurements relate to the size of the unit chosen.
- Estimate lengths using units of inches, feet, centimeters, and meters.
- Measure to determine how much longer one object is than another, expressing the length difference in terms of a standard length unit.

Relate addition and subtraction to length.

- Use addition and subtraction within 100 to solve word problems involving lengths that are given in the same units, e.g., by using drawings (such as drawings of rulers) and equations with a symbol for the unknown number to represent the problem.
- Represent whole numbers as lengths from 0 on a number line diagrams with equally spaced points corresponding to the numbers 0, 1, 2, …, and represent whole-number sums and differences within 100 on a number line diagram.

Evaluating Student Learning Outcomes

A Progression Toward Mastery is provided to describe steps that illuminate the gradually increasing understandings that students develop *on their way to proficiency.* In this chart, this progress is presented from left (Step 1) to right (Step 4). The learning goal for students is to achieve Step 4 mastery. These steps are meant to help teachers and students identify and celebrate what the students can do now, and what they need to work on next.

A Progression Toward Mastery				
Assessment Task Item	**STEP 1 Little evidence of reasoning without a correct answer. (1 Point)**	**STEP 2 Evidence of some reasoning without a correct answer. (2 Points)**	**STEP 3 Evidence of some reasoning with a correct answer or evidence of solid reasoning with an incorrect answer. (3 Points)**	**STEP 4 Evidence of solid reasoning with a correct answer. (4 Points)**
1	Student gets one of the four parts correct.	Student gets two of the four parts correct.	Student gets three of the four parts correct.	Student correctly: ▪ Measures the crayon as 9 cm. ▪ Measures the pencil as 11 cm. ▪ Determines that the pencil is longer. ▪ Determines the difference in length between the pencil and crayon is 2 cm.
2	Student gets one of the four parts correct.	Student gets two of the four parts correct.	Student gets three of the four parts correct.	Student correctly: ▪ Identifies a meter stick as the tool for measurement. ▪ Gives appropriate reasoning for selecting the meter stick. ▪ Represents the comparison of the throws with a picture and answers that Samantha threw her beanbag 3 m. ▪ Identifies Sarah as the winner and provides accurate explanation.

A Progression Toward Mastery				
3	▪ Student shows no movement on the ruler. ▪ Student is unable to answer the question correctly.	▪ Student shows only one movement on the ruler. ▪ Student correctly adds 7 but does not subtract 4.	▪ Student shows only one movement on the ruler. ▪ Correctly identifies the grasshopper stopped at 21 cm.	Student correctly: ▪ Uses a centimeter ruler as a number line, showing movement forward and backward as adding and subtracting. ▪ Correctly identifies the grasshopper stopped at 21 cm.
4	Student gets one part correct.	Student gets two to three of the six parts correct.	Student gets four to five of the six parts correct.	Student: ▪ Correctly measures the length of Ribbon A as 10 centimeters and 3 paper clips. ▪ Provides an accurate explanation of why there is a larger number of centimeters. ▪ Provides an appropriate estimate for Ribbon B in paper clips. ▪ Identifies that Ribbon A is 5 cm longer than Ribbon B. ▪ Determines the total length of both ribbons taped together is 15 cm. ▪ Correctly identifies 5 cm more ribbon is needed.

Name Joshua Date

Note: Students need a centimeter ruler and 6 small paper clips to complete the assessment.

1. Use your ruler to find the length of the pencil and the crayon.

a. How long is the crayon? 9 centimeters

b. How long is the pencil? 11 centimeters

c. Which is longer? (pencil) crayon

d. How much longer? 2 centimeters

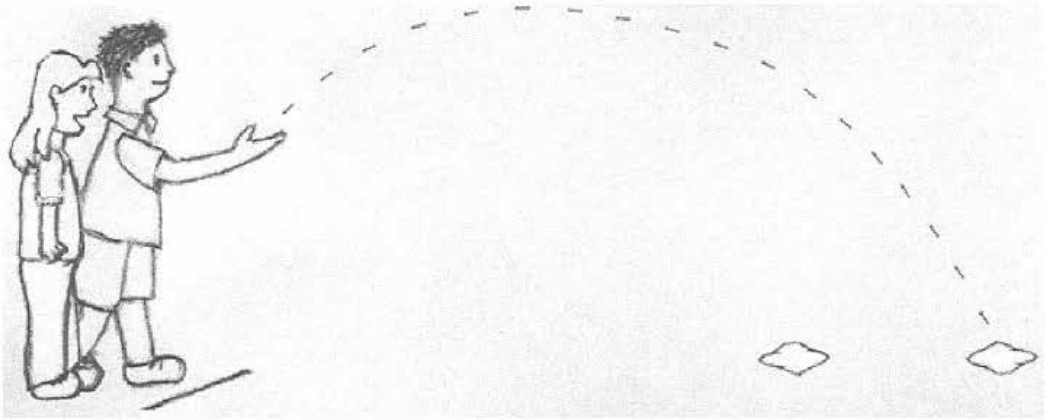
11 - 9 = 2

1 10

10 - 9 = 1

1 + 1 = 2

2. Samantha and Bill are having a bean bag throwing contest and need to measure each of their throws.



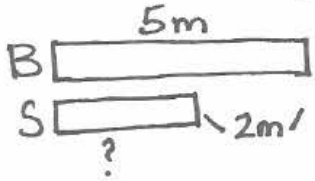
a. Circle the most appropriate tool to measure their throws.

ruler paper clips (meter stick) centimeter cubes

b. Explain your choice using pictures or words.

Samantha and Bill threw their bean bags far so a meter stick is most appropriate since it has the longest length-unit.

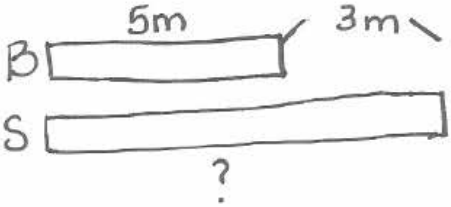
c. Bill throws his bean bag 5 meters, which was 2 meters farther than Samantha threw her bean bag. How far did Samantha throw her bean bag? Draw a diagram or picture to show the length of their throws.



5-2=3

Samantha threw her bean bag 3 meters.

d. Sarah threw her bean bag 3 meters farther than Bill. Who won the contest? How do you know?



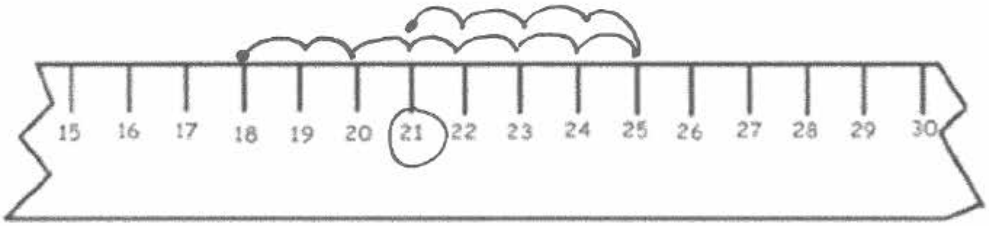
5+3=8

Sarah won the contest because she threw her bean bag 8m which is farther than anyone else.

3. Use the broken centimeter ruler to solve the problem.

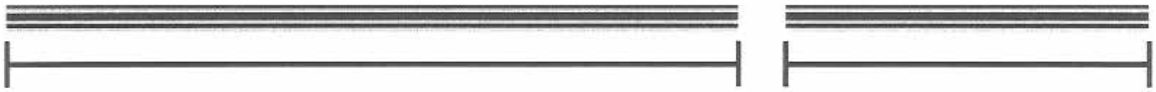
A grasshopper jumped 7 centimeters forward and 4 centimeters back and then stopped. If the grasshopper started at 18, where did the grasshopper stop? Show your work.

18+7=25 25-4=21 The grasshopper stopped at 21cm.



4.

Vanessa's Ribbons



Ribbon A Ribbon B

a. Measure the length of Ribbon A with your centimeter ruler and your paper clip. Write the measurements on the lines below.

10 centimeters 3 paper clips

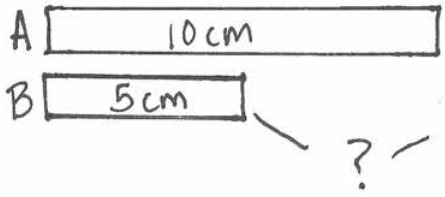
b. Explain why the number of centimeters is larger than the number of paper clips. Use pictures or words.

Centimeters have shorter length units than paper clips, so more centimeters are needed to measure than paper clips.

c. Estimate the length of Ribbon B in paper clips.

2 paper clips

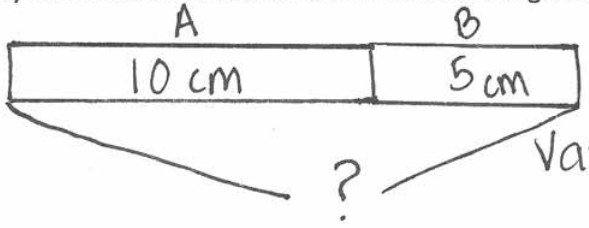
d. How much longer is Ribbon A than Ribbon B? Give your answer in centimeters.



10 - 5 = 5

Ribbon A is 5 cm longer than ribbon B.

e. Vanessa is using the ribbons to wrap a gift. If she tapes the ribbons together with no overlap, how many centimeters of ribbon does she have altogether?



10 + 5 = 15

Vanessa has 15 cm of ribbon.

f. If Vanessa needs 20 centimeters of ribbon, how much more does she need?

20 cm − 15 cm = 5 cm

Vanessa needs 5 cm of ribbon.

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Answer Key

Eureka Math Grade 2 Module 2

Special thanks go to the Gordon A. Cain Center and to the Department of Mathematics at Louisiana State University for their support in the development of *Eureka Math*.

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Published by Great Minds®.

Printed in the U.S.A.
This book may be purchased from the publisher at eureka-math.org.
10 9 8 7 6 5 4 3 2 1

ISBN 978-1-64054-318-8

Answer Key

GRADE 2 • MODULE 2

Addition and Subtraction of Length Units

Lesson 1

Sprint

Side A

1.	3	12.	7	23.	100	34.	148
2.	13	13.	17	24.	21	35.	162
3.	23	14.	27	25.	121	36.	188
4.	73	15.	57	26.	36	37.	169
5.	5	16.	14	27.	136	38.	180
6.	4	17.	47	28.	23	39.	193
7.	14	18.	13	29.	123	40.	189
8.	24	19.	37	30.	144	41.	198
9.	84	20.	18	31.	139	42.	170
10.	9	21.	88	32.	148	43.	200
11.	8	22.	100	33.	149	44.	159

Side B

1.	2	12.	6	23.	100	34.	148
2.	12	13.	16	24.	31	35.	172
3.	22	14.	26	25.	131	36.	168
4.	72	15.	56	26.	35	37.	159
5.	4	16.	13	27.	135	38.	190
6.	3	17.	46	28.	22	39.	194
7.	13	18.	12	29.	122	40.	169
8.	23	19.	36	30.	143	41.	197
9.	83	20.	18	31.	129	42.	180
10.	8	21.	78	32.	148	43.	200
11.	7	22.	100	33.	149	44.	179

Problem Set

1. 6
2. 5
3. 7
4. 9
5. 9 cm
6. a. 14 cm
   b. 9 cm

Exit Ticket

No; explanations will vary.

Homework

1. 4
2. 5
3. 4
4. 10
5. 73 cm
6. 47 cm
7. 29 cm

Lesson 2

Problem Set

1. 4
2. 6
3. 10
4. 40 cm
5. Answers will vary.

Exit Ticket

a. No. Explanations will vary.

b. Answers will vary.

Homework

1. 5
2. 8
3. 7
4. a. 9
   b. 6
   c. 4
   d. Red
   e. Yellow
   f. 19

Lesson 3

Sprint

Side A

1.	10	12.	1	23.	7	34.	9
2.	1	13.	1	24.	7	35.	2
3.	2	14.	5	25.	3	36.	4
4.	3	15.	5	26.	5	37.	1
5.	4	16.	2	27.	5	38.	5
6.	5	17.	2	28.	8	39.	24
7.	9	18.	4	29.	8	40.	12
8.	8	19.	4	30.	8	41.	33
9.	7	20.	3	31.	9	42.	14
10.	6	21.	3	32.	9	43.	26
11.	0	22.	7	33.	9	44.	32

Side B

1.	0	12.	5	23.	6	34.	8
2.	1	13.	5	24.	6	35.	3
3.	2	14.	1	25.	4	36.	6
4.	3	15.	1	26.	1	37.	5
5.	4	16.	2	27.	1	38.	1
6.	5	17.	2	28.	7	39.	26
7.	9	18.	3	29.	7	40.	11
8.	8	19.	3	30.	7	41.	36
9.	7	20.	4	31.	8	42.	13
10.	6	21.	4	32.	8	43.	27
11.	10	22.	6	33.	8	44.	31

Problem Set

1. 4
2. 6
3. 9
4. Side A = 4 cm; Side B = 9 cm; Side C = 8 cm
   a. Side A
   b. 13
   c. 1

Exit Ticket

1. a. 6
   b. 10
   c. 3
2. 8

Homework

1. 3
2. 13
3. 10
4. Side A = 3 cm; Side B = 6 cm; Side C = 5 cm
   a. Side B
   b. 3
   c. 2
   d. 12
   e. 20

Lesson 4

Sprint

Side A

1.	11	12.	3	23.	9	34.	14
2.	11	13.	13	24.	6	35.	8
3.	8	14.	13	25.	15	36.	6
4.	3	15.	8	26.	15	37.	13
5.	11	16.	5	27.	8	38.	13
6.	11	17.	12	28.	7	39.	7
7.	7	18.	12	29.	13	40.	6
8.	4	19.	7	30.	13	41.	16
9.	12	20.	5	31.	9	42.	16
10.	12	21.	15	32.	4	43.	9
11.	9	22.	15	33.	14	44.	7

Side B

1.	11	12.	4	23.	8	34.	14
2.	11	13.	13	24.	7	35.	9
3.	9	14.	13	25.	15	36.	5
4.	2	15.	7	26.	15	37.	14
5.	11	16.	6	27.	9	38.	14
6.	11	17.	12	28.	6	39.	8
7.	6	18.	12	29.	12	40.	6
8.	5	19.	9	30.	12	41.	17
9.	12	20.	3	31.	7	42.	17
10.	12	21.	15	32.	5	43.	9
11.	8	22.	15	33.	14	44.	8

Problem Set

1. Answers will vary.
2. Answers will vary.
3. Answers will vary.
4. 28

Exit Ticket

1. a. m
   b. cm
   c. m
2. Centimeters; explanations will vary.

Homework

1. a. cm
   b. m
   c. cm
   d. cm
   e. m
   f. m
   g. cm
   h. cm
   i. m
   j. m
2. a. m
   b. m
   c. cm
   d. m
   e. cm
3. a. Triangle A: 3
      Rhombus B: 3
      Semicircle C: 5
      Hexagon D: 4
      Rectangle E: 4
   b. Answers will vary.

Lesson 5

Problem Set

1. a. Answers will vary.
   b. 6
2. a. Answers will vary.
   b. 15
3. a. Answers will vary.
   b. 11
4. a. Answers will vary.
   b. 8
5. a. Answers will vary.
   b. 5
6. a. Meters; answers will vary.
   b. Centimeters; answers will vary.
   c. Meters; answers will vary.
   d. Meters; answers will vary.
   e. Centimeters; answers will vary.
7. a. Answers will vary.
   b. Answers will vary.
   c. Answers will vary.

Exit Ticket

1. a. 1 cm
   b. 2 m
   c. 17 cm
2. Answers will vary.
3. Answers will vary.

Homework

1. Answers will vary.
2. a. 3 m
   b. 14 cm
   c. 17 cm
   d. 16 cm
   e. 50 m
3. a. 6
   b. 1
   c. 15
   d. 9
   e. 4

Lesson 6

Sprint

Side A

1.	1 cm	12.	55 cm	23.	110 cm	34.	133 cm
2.	11 cm	13.	65 cm	24.	110 cm	35.	133 cm
3.	12 cm	14.	66 cm	25.	111 cm	36.	142 cm
4.	22 cm	15.	86 cm	26.	101 cm	37.	144 cm
5.	30 cm	16.	68 m	27.	111 cm	38.	154 cm
6.	31 cm	17.	88 cm	28.	112 cm	39.	155 cm
7.	43 cm	18.	98 cm	29.	115 cm	40.	199 cm
8.	33 cm	19.	98 m	30.	115 cm	41.	225 cm
9.	53 cm	20.	1 m	31.	116 cm	42.	255 cm
10.	50 cm	21.	101 cm	32.	108 cm	43.	295 cm
11.	55 cm	22.	1 m	33.	119 cm	44.	3 m

Side B

1.	1 cm	12.	70 cm	23.	111 cm	34.	132 cm
2.	12 cm	13.	75 cm	24.	110 cm	35.	133 cm
3.	12 cm	14.	77 cm	25.	110 cm	36.	143 cm
4.	32 cm	15.	87 cm	26.	111 cm	37.	144 cm
5.	40 cm	16.	97 m	27.	117 cm	38.	154 cm
6.	41 cm	17.	88 cm	28.	112 cm	39.	155 cm
7.	44 cm	18.	98 cm	29.	115 cm	40.	199 cm
8.	54 cm	19.	1 m	30.	116 cm	41.	225 cm
9.	65 cm	20.	100 cm	31.	117 cm	42.	255 cm
10.	60 cm	21.	101 cm	32.	118 cm	43.	295 cm
11.	65 cm	22.	101 cm	33.	120 cm	44.	3 m

Problem Set

1. a. 15
   5
   b. 10
2. a. 8
   9
   b. 1
3. a. 4
   7
   8
   b. 19
   c. 3
   d. 1
   e. 6
4. a. 10
   b. 20
   c. 15
   d. 19
5. 24 cm
6. 61 cm
7. 12; Rectangle drawn with longest sides labeled 24 cm and shortest sides labeled 12 cm; 72

Exit Ticket

1. 3
2. 7
3. 2; shorter

Homework

1. a. 4
   b. 24
2. a. 8
   9
   5
   b. 22
   c. 3
   d. 1
   e. 4
   f. 7
3. a. 25
   b. 15
   c. 20
   d. 245
4. a. 10
   b. 35
   c. 49
5. a. 33 m
   b. 63 m

Lesson 7

Sprint

Side A

1.	2	12.	71	23.	1	34.	50
2.	12	13.	2	24.	11	35.	2
3.	22	14.	12	25.	51	36.	12
4.	52	15.	22	26.	60	37.	82
5.	2	16.	92	27.	1	38.	94
6.	12	17.	2	28.	11	39.	72
7.	22	18.	12	29.	21	40.	53
8.	62	19.	22	30.	61	41.	32
9.	1	20.	42	31.	4	42.	22
10.	11	21.	40	32.	14	43.	45
11.	21	22.	80	33.	74	44.	63

Side B

1.	1	12.	81	23.	1	34.	80
2.	11	13.	3	24.	11	35.	2
3.	21	14.	13	25.	61	36.	12
4.	51	15.	23	26.	30	37.	72
5.	3	16.	93	27.	1	38.	84
6.	13	17.	1	28.	11	39.	62
7.	23	18.	11	29.	21	40.	43
8.	63	19.	21	30.	71	41.	22
9.	1	20.	41	31.	4	42.	32
10.	11	21.	20	32.	14	43.	55
11.	21	22.	60	33.	74	44.	73

Problem Set

1. a. 3
   9
   b. 2
   6
   c. 1
   d. 3
2. a. 3
   9
   b. 1
   3
   c. 2
   d. 3
3. Lines measuring 6 cm and 15 cm drawn
   a. 2
   5
   b. 9
   c. 3
   d. 7
   e. 21
4. Answers will vary.

Exit Ticket

a. 4
   12
b. 2
   6
c. 3
   9
d. Answers will vary

Homework

1. a. 3
   9
   b. 6; 18
2. a. 5
   15
   b. 2
   6
   c. 3
   d. 3
3. Lines measuring 9 cm and 12 cm drawn
   a. 3
   4
   b. 3
   c. 1
   d. 7
   e. 21
4. a. 4
   b. 6
   c. Answers will vary

Lesson 8

Sprint

Side A

1.	90 cm	12.	75 cm	23.	38 cm	34.	45 cm
2.	70 cm	13.	73 cm	24.	28 cm	35.	56 cm
3.	50 cm	14.	63 cm	25.	8 cm	36.	45 cm
4.	30 cm	15.	62 cm	26.	71 cm	37.	12 cm
5.	10 cm	16.	61 cm	27.	61 cm	38.	67 cm
6.	20 cm	17.	51 cm	28.	41 cm	39.	34 cm
7.	40 cm	18.	50 cm	29.	11 cm	40.	1 cm
8.	60 cm	19.	48 cm	30.	12 cm	41.	89 cm
9.	80 cm	20.	44 cm	31.	32 cm	42.	85 cm
10.	79 cm	21.	42 cm	32.	82 cm	43.	83 cm
11.	77 cm	22.	38 cm	33.	85 cm	44.	81 cm

Side B

1.	99 cm	12.	67 cm	23.	28 cm	34.	90 cm
2.	90 cm	13.	65 cm	24.	18 cm	35.	89 cm
3.	80 cm	14.	63 cm	25.	72 cm	36.	67 cm
4.	60 cm	15.	61 cm	26.	62 cm	37.	45 cm
5.	40 cm	16.	51 cm	27.	52 cm	38.	78 cm
6.	20 cm	17.	41 cm	28.	55 cm	39.	12 cm
7.	10 cm	18.	40 cm	29.	57 cm	40.	1 cm
8.	30 cm	19.	38 cm	30.	66 cm	41.	99 cm
9.	50 cm	20.	34 cm	31.	76 cm	42.	95 cm
10.	70 cm	21.	32 cm	32.	86 cm	43.	93 cm
11.	69 cm	22.	28 cm	33.	88 cm	44.	83 cm

Problem Set

1. a. 8
   b. 9
   c. 17
   d. 1; shorter
2. 19 cm
3. 32
4. a. 35
   b. 42
   c. 7

Exit Ticket

Line drawn beginning at 2 cm and ending at 12 cm labeled R; line drawn beginning at 5 cm and ending at 11 cm labeled S

a. Line R extended by 3 cm; Line S extended by 4 cm

b. 13

c. 10

d. 3; shorter

Homework

1. a. 10
   b. 7
   c. 17
   d. 3; longer
2. 18 m
3. a. 3 written in each box
   b. 15
   c. 2
4. 27 cm

Lesson 9

Problem Set

1. Answers will vary.
   a. Answers will vary.
   b. Answers will vary.
2. a. Path 1
   b. Path 3
   c. Answers will vary.
3. a. Answers will vary.
   b. 22
   c. Answers will vary.

Exit Ticket

1. 15; 8
2. No; answers will vary.
3. Tape diagram showing that 15 cm is 7 cm longer than 8 cm

Homework

1. a. 33
   b. Answers will vary.
   c. Answers will vary.
2. a. 9
   b. 11
   c. 20
   d. 2; shorter
3. a. 84
   b. Steven
   c. Tape diagram showing that 84 cm is 9 cm longer than 75 cm

Lesson 10

Problem Set

1. Step 1: 12 cm
   Step 2: 38 cm
2. Step 1: Tape diagram is appropriately drawn; 21 cm
   Step 2: Tape diagram is appropriately drawn; 51 cm
3. Step 1: Tape diagram is appropriately drawn; 26 cm
   Step 2: Tape diagram is appropriately drawn; 46 cm

Exit Ticket

24 cm

Homework

1. Step 1: 20 cm
   Step 2: 49 cm
2. Step 1: Tape diagram is appropriately drawn; 60 cm
   Step 2: Tape diagram is appropriately drawn; 101 cm

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