

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.NBT.2** (2 minutes)
- Making Ten by Identifying the Missing Part **2.OA.2** (3 minutes)
- Sprint: Making Ten **2.OA.2** (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.

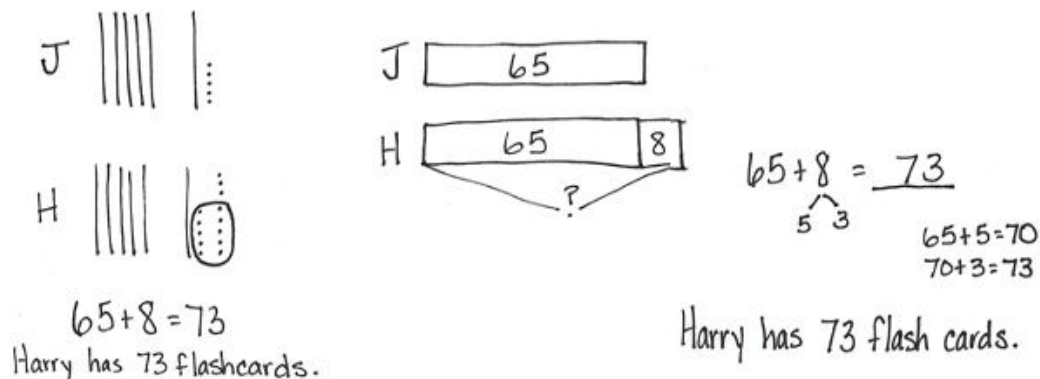
T: Turn and tell your partner what pattern you noticed that helped you solve the problems.

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)


Handwritten student work for the Application Problem:

Jamie's work: 6 tens rods and 5 units rods.

Harry's work: 6 tens rods, 5 units rods, and 8 more units rods.

Equation: $65 + 8 = 73$

Sentence: Harry has 73 flashcards.

Diagram: A ten-frame showing 65 in the first ten and 8 in the last two, with a question mark in the empty space.

Equation: $65 + 8 = 73$

Strategy: $65 + 5 = 70$, $70 + 3 = 73$

Sentence: Harry has 73 flash cards.

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.)



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.

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.

MP.6 After all students have completed their rulers, invite them to the carpet with their rulers, centimeter cubes, index cards, and pencils.

- 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.



**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: 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.

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.

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.

NYS COMMON CORE MATHEMATICS CURRICULUM Lesson 3 Problem Set 2•2

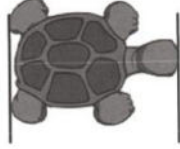
Name Roberto Date _____

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.



COMMON CORE Lesson 3: Apply concepts to create unit rulers, measure lengths using unit rulers, rulers, 5/2/14 engage^{ny} 2.A.31

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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 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?

NYS COMMON CORE MATHEMATICS CURRICULUM Lesson 3 Problem Set 2•2

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? 13 centimeters.
 $\frac{4}{2} + 9 = 10 + 3 = 13$

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

COMMON CORE Lesson 3: Apply concepts to create unit rulers, measure lengths using unit rulers, rulers, S/3/14. engage^{ny} 2.A.32

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.	$0 + \underline{\quad} = 10$	
2.	$9 + \underline{\quad} = 10$	
3.	$8 + \underline{\quad} = 10$	
4.	$7 + \underline{\quad} = 10$	
5.	$6 + \underline{\quad} = 10$	
6.	$5 + \underline{\quad} = 10$	
7.	$1 + \underline{\quad} = 10$	
8.	$2 + \underline{\quad} = 10$	
9.	$3 + \underline{\quad} = 10$	
10.	$4 + \underline{\quad} = 10$	
11.	$10 + \underline{\quad} = 10$	
12.	$9 + \underline{\quad} = 10$	
13.	$19 + \underline{\quad} = 20$	
14.	$5 + \underline{\quad} = 10$	
15.	$15 + \underline{\quad} = 20$	
16.	$8 + \underline{\quad} = 10$	
17.	$18 + \underline{\quad} = 20$	
18.	$6 + \underline{\quad} = 10$	
19.	$16 + \underline{\quad} = 20$	
20.	$7 + \underline{\quad} = 10$	
21.	$17 + \underline{\quad} = 20$	
22.	$3 + \underline{\quad} = 10$	

23.	$13 + \underline{\quad} = 20$	
24.	$23 + \underline{\quad} = 30$	
25.	$27 + \underline{\quad} = 30$	
26.	$5 + \underline{\quad} = 10$	
27.	$25 + \underline{\quad} = 30$	
28.	$2 + \underline{\quad} = 10$	
29.	$22 + \underline{\quad} = 30$	
30.	$32 + \underline{\quad} = 40$	
31.	$1 + \underline{\quad} = 10$	
32.	$11 + \underline{\quad} = 20$	
33.	$21 + \underline{\quad} = 30$	
34.	$31 + \underline{\quad} = 40$	
35.	$38 + \underline{\quad} = 40$	
36.	$36 + \underline{\quad} = 40$	
37.	$39 + \underline{\quad} = 40$	
38.	$35 + \underline{\quad} = 40$	
39.	$\underline{\quad} + 6 = 30$	
40.	$\underline{\quad} + 8 = 20$	
41.	$\underline{\quad} + 7 = 40$	
42.	$\underline{\quad} + 6 = 20$	
43.	$\underline{\quad} + 4 = 30$	
44.	$\underline{\quad} + 8 = 40$	

B

Number Correct: _____

Improvement: _____

Making Ten

1.	$10 + \underline{\quad} = 10$	
2.	$9 + \underline{\quad} = 10$	
3.	$8 + \underline{\quad} = 10$	
4.	$7 + \underline{\quad} = 10$	
5.	$6 + \underline{\quad} = 10$	
6.	$5 + \underline{\quad} = 10$	
7.	$1 + \underline{\quad} = 10$	
8.	$2 + \underline{\quad} = 10$	
9.	$3 + \underline{\quad} = 10$	
10.	$4 + \underline{\quad} = 10$	
11.	$0 + \underline{\quad} = 10$	
12.	$5 + \underline{\quad} = 10$	
13.	$15 + \underline{\quad} = 20$	
14.	$9 + \underline{\quad} = 10$	
15.	$19 + \underline{\quad} = 20$	
16.	$8 + \underline{\quad} = 10$	
17.	$18 + \underline{\quad} = 20$	
18.	$7 + \underline{\quad} = 10$	
19.	$17 + \underline{\quad} = 20$	
20.	$6 + \underline{\quad} = 10$	
21.	$16 + \underline{\quad} = 20$	
22.	$4 + \underline{\quad} = 10$	

23.	$14 + \underline{\quad} = 20$	
24.	$24 + \underline{\quad} = 30$	
25.	$26 + \underline{\quad} = 30$	
26.	$9 + \underline{\quad} = 10$	
27.	$29 + \underline{\quad} = 30$	
28.	$3 + \underline{\quad} = 10$	
29.	$23 + \underline{\quad} = 30$	
30.	$33 + \underline{\quad} = 40$	
31.	$2 + \underline{\quad} = 10$	
32.	$12 + \underline{\quad} = 20$	
33.	$22 + \underline{\quad} = 30$	
34.	$32 + \underline{\quad} = 40$	
35.	$37 + \underline{\quad} = 40$	
36.	$34 + \underline{\quad} = 40$	
37.	$35 + \underline{\quad} = 40$	
38.	$39 + \underline{\quad} = 40$	
39.	$\underline{\quad} + 4 = 30$	
40.	$\underline{\quad} + 9 = 20$	
41.	$\underline{\quad} + 4 = 40$	
42.	$\underline{\quad} + 7 = 20$	
43.	$\underline{\quad} + 3 = 30$	
44.	$\underline{\quad} + 9 = 40$	

Name _____

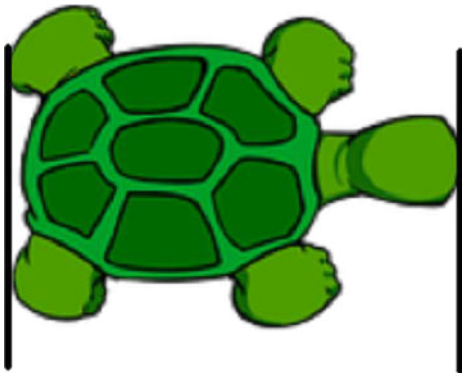
Date _____

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.

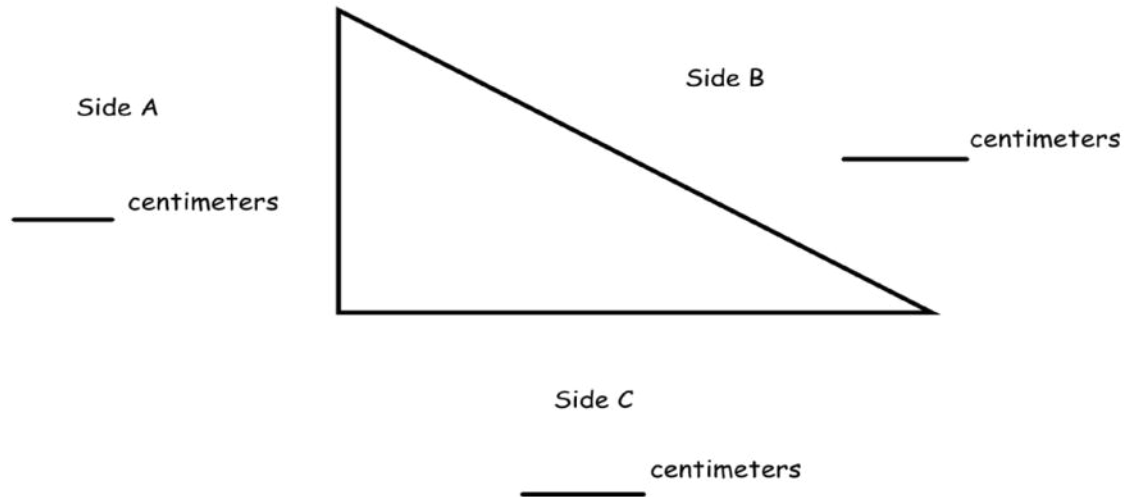


3. The picture



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 

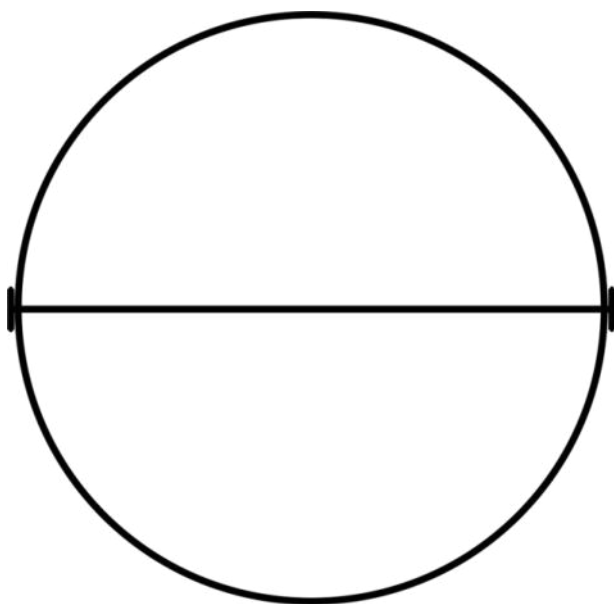
b. Line B is _____ cm long.

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.

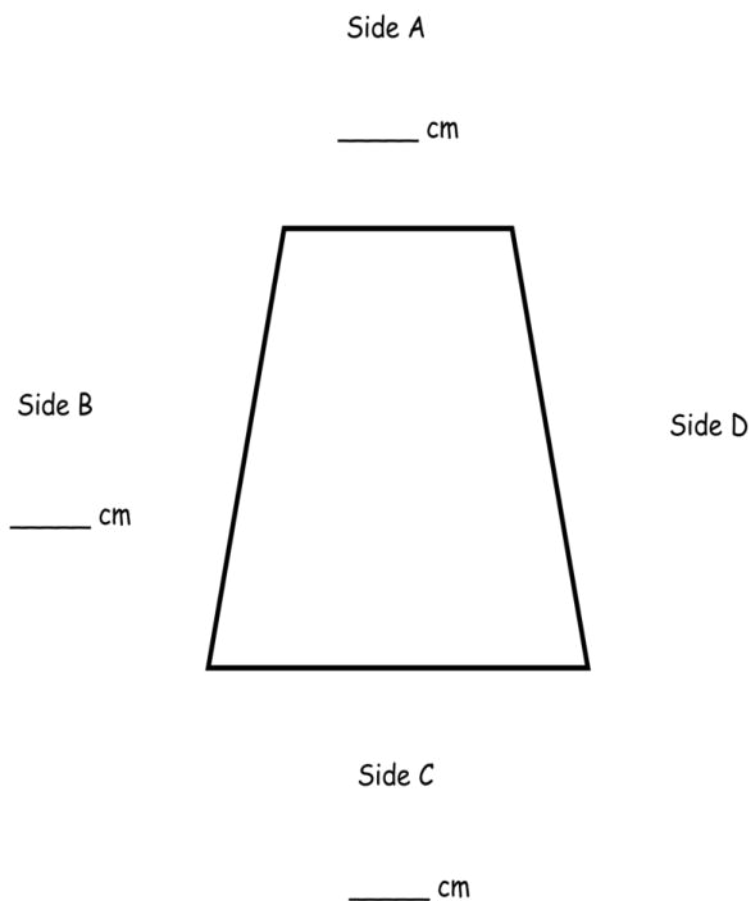


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3. The picture of the fish tank is _____ cm longer than the picture of the fish.

the
Sides
Write
the

4. Measure
lengths of
A, B, and C.
each length on
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