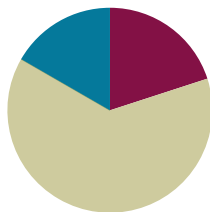# Lesson 10

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 **2.NBT.5**   (6 minutes)
- Take from Ten **2.OA.2**   (3 minutes)
- Relate Subtraction to Addition **2.OA.2**   (3 minutes)

Meter Strip Subtraction: Subtracting Multiples of 10 from Numbers (6 minutes)

Materials: (S) Meter strips (Lesson 6 Template) (as pictured)

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.
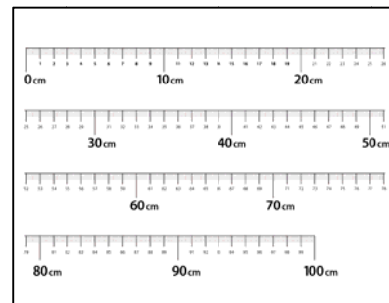
Continue with the following possible sequence: 45 cm, 52 cm, 64 cm, 74 cm, 82 cm, 91 cm, and 99 cm. As your students show mastery, advance to subtracting 20 centimeters.

Take from Ten (3 minutes)

Note: Students revisit this activity from Module 1 in preparation for more practice of subtraction in Module 3. 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 boards.)

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.

T: $13 - 1$.

S: $10 + 2$.

T: Answer.

S: 12.

(Draw on board)
$12 - 1 =$____
/\
10   2

> **NOTES ON MULTIPLE MEANS OF REPRESENTATION:**
>
> Students who are struggling with pictorial representations may need to use concrete models (e.g., unifix 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.

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 $14 - 2$.

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?
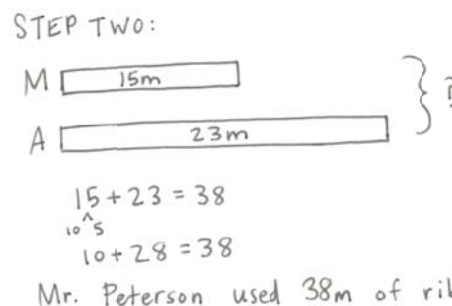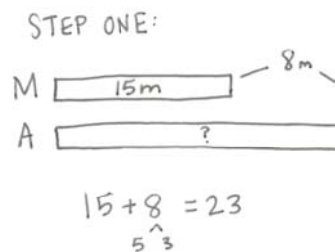
S: The whole.

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.)

STEP ONE:

M [15m] — 8m —

A [?   ]

15 + 8 = 23
     5 3

STEP TWO:

M [15m]

A [23m   ] } ?

15 + 23 = 38
  10 5
   10 + 28 = 38

Mr. Peterson used 38m of ribbon in all.

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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 the students through a similar process to that of Problem 1. Have them work the problem with you.

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 your number sentence.
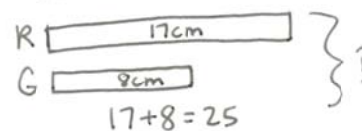
Step 2: Redraw the model with 8 centimeters labeled in the lower bar and the unknown marked to the right with a question mark and bracket. Find the total of both lengths. Write your number sentence and statement of the solution.

Once having completed both problems, have students compare Problems 1 and 2.
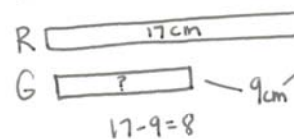
STEP ONE:
R [17cm]
G [?] ~ 9cm
17-9=8
STEP TWO:
R [17cm]
G [8cm] } ?
17+8=25
The total length of both pencils is 25cm.

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: 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

> **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.

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be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson.

You may choose to use any combination of the questions below to lead the discussion.

MP.3

- 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?

- Look at Problem 3. How did you change your tape diagram in Step 2 to find the total length of the leather strips?

- 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?

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
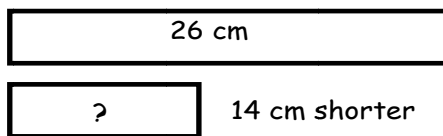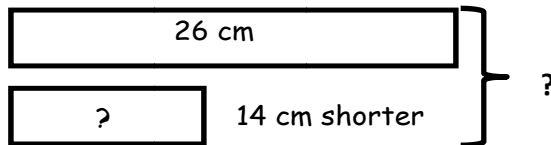
Name _____   Date _____

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 the ribbons?

    Step 1: Find the length of Colleen's ribbon.

               | 26 cm |

               | ? | 14 cm shorter

    Step 2: Find the length of both ribbons.

               | 26 cm | ?

               | ? | 14 cm shorter

2. Jesse's doll is 30 cm tall. Sarah's doll is 9 cm shorter than Jessie's doll. What is the total length of both dolls?

    Step 1: Find the length of Sarah's doll.

    Step 2: Find the length of both dolls.

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3. 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?

   Step 1: Find the length of black leather strip after being cut.

   Step 2: Find the length of the black and brown leather strips together.

4. 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.

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Name _____   Date _____

The length of a crayon is 9 centimeters. A pencil is 11 centimeters longer than the crayon. What is the total length of both the crayon and the pencil?

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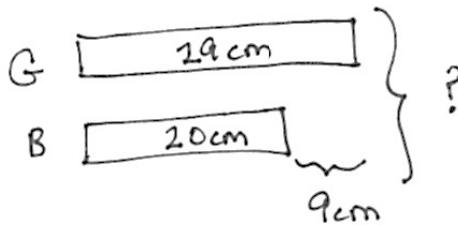
Name _____   Date _____

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.
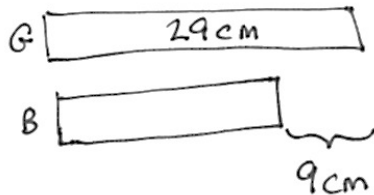
    Step 2: Find the length of both the blue and green ribbons.

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.

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