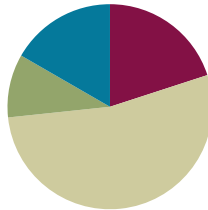# Lesson 10

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)

- 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 (as pictured)

Note: Students fluently subtract multiples of ten 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: (Students 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: 45cm, 52cm, 64cm, 74cm, 82cm, 91cm, 99 cm. Repeat the sequence but sliding back 20.

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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 possible sequences: $12 - 4$, $12 - 5$, $14 - 5$, $14 - 6$, $14 - 7$, $15 - 7$, $15 - 8$, $15 - 9$, $16 - 9$, and $16 - 8$.

Relate Subtraction to Addition (3 minutes)

Note: The review of Module 1 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 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.

> **NOTES ON MULTIPLE MEANS OF REPRESENTATION:**
>
> Students who are struggling with pictorial representations may need to use concrete models (e.g., base ten blocks) to demonstrate conceptual understanding of addition and subtraction. The teacher can also add incremented bars to the tape diagram as a transition from base ten blocks to a pictorial model.

Continue with possible sequences: $14 - 1$, $15 - 1$, $16 - 1$, $17 - 1$, $17 - 2$, $17 - 4$, $16 - 4$, $15 - 4$, $15 - 2$, and $14 - 2$.

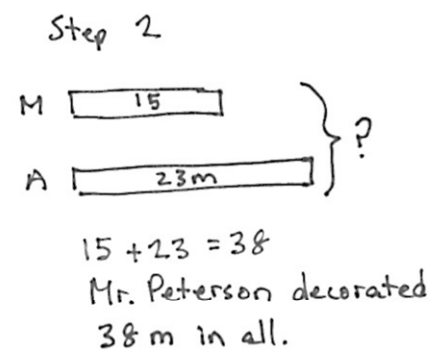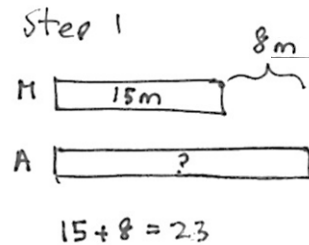## Concept Development (38 minutes)

Materials: (S) Personal white boards

Post the 2 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 lesson.

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Problem 1

Mr. Peterson decorated 15 meters of ribbon in the morning. He decorated 8 more meters in the afternoon than in the morning. How many meters did Mr. Peterson decorate in the morning and afternoon in all?

T: Let's read Problem 1 together. (Read number one chorally.)

T: (Draw a bar on the board under Step 1 and label it morning.)

T: How many meters did Mr. Peterson decorate in the morning?

S: 15 meters.

T: When did he decorate again?

S: In the afternoon.

T: Did he decorate more or less meters 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: What is this measurement here, the difference between his ribbon in the morning and afternoon?

S: 8 meters.

T: And what is this length? (Point to the part of the bar directly below the morning measurement.)

S: 15 meters.

T: (Draw a line to separate that part and label the question mark below.)

T: What is the length of the ribbon Mr. Peterson decorated in the afternoon?

S: 23 meters.

T: What do we still need to find out?

S: Figure out how many meters in the morning AND in the afternoon. → Add the morning meters and the afternoon meters.

T: This is Step 2. (Redraw the same model with the 23 meters recorded and the question mark to the right as shown to the right.)

T: How many meters in the morning and afternoon did Mr. Peterson decorate? Turn and talk.

S: 38 because 15 and 23 makes 38. → 10 + 20 = 30 and 5 + 3 = 8, 30 + 8 = 38.

T: (Cross out the question mark and write 38 to show the solution.) You just solved Step 2.

Step 1

M [15m] 8m

A [?]

15 + 8 = 23

Step 2

M [15]

A [23m] }?

15 + 23 = 38
Mr. Peterson decorated 38 m in all.

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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 into 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 1

R [17cm]

G [?]

$17 - 9 = 8$ 9cm

Step 2

R [17cm]

G [8'mcm]   } ?

$17 + 8 = 25$

The total length of both pencils is 25 cm.
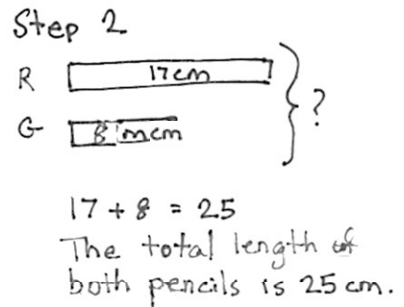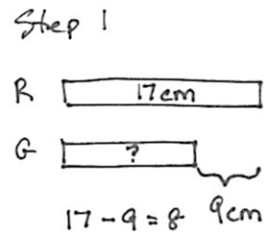
Problem Set (10 minutes)

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 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.

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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. 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.

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A

Correct _____

Subtract.

1	53 - 2 =		23	84 - 40 =	
2	65 - 3 =		24	80 - 50 =	
3	77 - 4 =		25	86 - 50 =	
4	89 - 5 =		26	70 - 60 =	
5	99 - 6 =		27	77 - 60 =	
6	28 - 7 =		28	80 - 70 =	
7	39 - 8 =		29	88 - 70 =	
8	31 - 2 =		30	48 - 4 =	
9	41 - 3 =		31	80 - 40 =	
10	51 - 4 =		32	81 - 40 =	
11	61 - 5 =		33	46 - 3 =	
12	30 - 9 =		34	60 - 30 =	
13	40 - 8 =		35	68 - 30 =	
14	50 - 7 =		36	67 - 4 =	
15	60 - 6 =		37	67 - 40 =	
16	40 - 30 =		38	89 - 6 =	
17	41 - 30 =		39	89 - 60 =	
18	40 - 20 =		40	76 - 2 =	
19	42 - 20 =		41	76 - 20 =	
20	80 - 50 =		42	54 - 6 =	
21	85 - 50 =		43	65 - 8 =	
22	80 - 40 =		44	87 - 9 =	

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B

Improvement _____   # Correct _____

Subtract.

| #			#		
1	43 - 2 =		23	94 - 50 -	
2	55 - 3 =		24	90 - 60 -	
3	67 - 4 =		25	96 - 60 =	
4	79 - 5 =		26	80 - 70 =	
5	89 - 6 =		27	87 - 70 =	
6	98 - 7 =		28	90 - 80 =	
7	29 - 8 =		29	98 - 80 =	
8	21 - 2 =		30	39 - 4 =	
9	31 - 3 =		31	90 - 40 =	
10	41 - 4 =		32	91 - 40 =	
11	51 - 5 =		33	47 - 3 =	
12	20 - 9 =		34	70 - 30 =	
13	30 - 8 =		35	78 - 30 =	
14	40 - 7 =		36	68 - 4 =	
15	50 - 6 =		37	68 - 40 =	
16	30 - 20 =		38	89 - 7 =	
17	31 - 20 =		39	89 - 70 =	
18	50 - 30 =		40	56 - 2 =	
19	52 - 30 =		41	56 - 20 =	
20	70 - 40 =		42	34 - 6 =	
21	75 - 40 =		43	45 - 8 =	
22	90 - 50 =		44	57 - 9 =	

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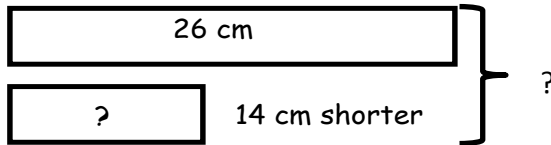
Name _____   Date _____

Draw a tape diagram for each step.

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
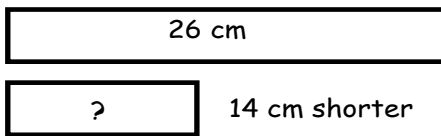
    | ? | 14 cm shorter
    |---|

    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.

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 measured 10 cm. Mark's measured 3 cm more than Pam's. What might be the total length around their wrists (all four 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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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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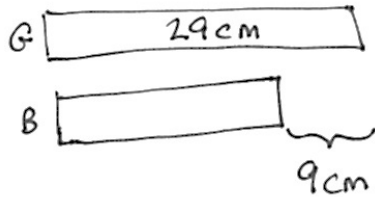
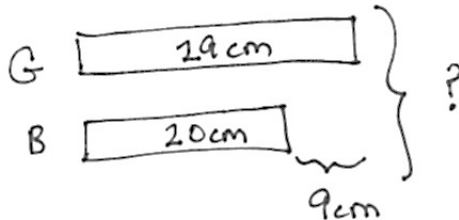Date: 4/14/14

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Draw a tape diagram for each step.

1. There is 29 cm of green ribbon. A blue ribbon is 9 cm shorter than the green ribbon. How long is the green 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 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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