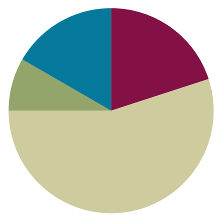
Lesson 4

Objective: Use meters to model the decomposition of one whole into hundredths. Represent and count hundredths.

Suggested Lesson Structure

- Fluency Practice (12 minutes)
- Application Problem (5 minutes)
- Concept Development (33 minutes)
- Student Debrief (10 minutes)

Total Time **(60 minutes)**



Fluency Practice (12 minutes)

- Sprint: Write Fractions and Decimals **4.NF.6** (9 minutes)
- Count by Tenths **4.NF.6** (3 minutes)

Sprint: Write Fractions and Decimals (9 minutes)

Materials: (S) Write Fractions and Decimals Sprint

Note: This Sprint reviews Lessons 1–3.

Count by Tenths (3 minutes)

Materials: (S) Personal white board

Note: This fluency activity reviews Lessons 1–2.

T: Count by twos to 20, starting at zero. (Write as students count.)

$\frac{0}{10}$	$\frac{2}{10}$	$\frac{4}{10}$	$\frac{6}{10}$	$\frac{8}{10}$	$\frac{10}{10}$	$\frac{12}{10}$	$\frac{14}{10}$	$\frac{16}{10}$	$\frac{18}{10}$	$\frac{20}{10}$
0					1					2

S: 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20.

T: Count by 2 tenths to 20 tenths, starting at 0 tenths. (Write as students count.)

S: $\frac{0}{10}, \frac{2}{10}, \frac{4}{10}, \frac{6}{10}, \frac{8}{10}, \frac{10}{10}, \frac{12}{10}, \frac{14}{10}, \frac{16}{10}, \frac{18}{10}, \frac{20}{10}$.

T: 1 is the same as how many tenths?

S: 10 tenths.

T: (Beneath $\frac{10}{10}$, write 1.)

Continue the process for 2.

T: Let's count by 2 tenths again. This time, when you come to a whole number, say the whole number. Try not to look at the board.

S: $0, \frac{2}{10}, \frac{4}{10}, \frac{6}{10}, \frac{8}{10}, 1, \frac{12}{10}, \frac{14}{10}, \frac{16}{10}, \frac{18}{10}, 2.$

T: Count backward by 2 tenths, starting at 2.

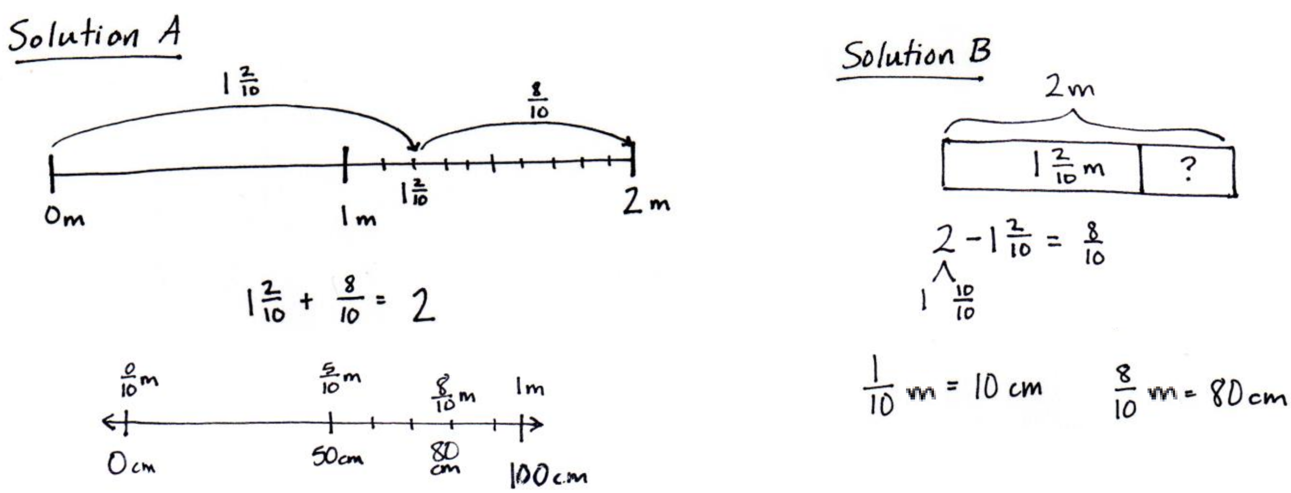
S: $2, \frac{18}{10}, \frac{16}{10}, \frac{14}{10}, \frac{12}{10}, 1, \frac{8}{10}, \frac{6}{10}, \frac{4}{10}, \frac{2}{10}, \frac{0}{10}.$

Application Problem (5 minutes)

Ali is knitting a scarf that will be 2 meters long. So far, she has knitted $1\frac{2}{10}$ meters.

a. How many more meters does Ali need to knit to complete the scarf? Write the answer as a fraction and as a decimal.

b. How many more centimeters does Ali need to knit to complete the scarf?



a) Ali needs to knit $\frac{8}{10}$ meters or 0.8 meters more.

b) Ali needs to knit 80 more centimeters.

Note: This Application Problem reviews mixed decimal fractions and *counting on* to make 1 more. Revisit the problem in the Debrief to answer in hundredths meters.

Concept Development (33 minutes)

Materials: (T) Meter stick, 1-meter strip of paper partitioned into 10 equal parts by folds or dotted lines
(S) Personal white board, tape diagram in tenths (Template), pencil

Problem 1: Recognize 1 centimeter as $\frac{1}{100}$ of a meter, which can be written as $\frac{1}{100}$ m and as 0.01 m.

T: This is a meter stick. What is its length?

S: 1 meter.

T: How many centimeters are in a meter?

S: 100 centimeters.

T: (Write on the board 1 m = 100 cm.)

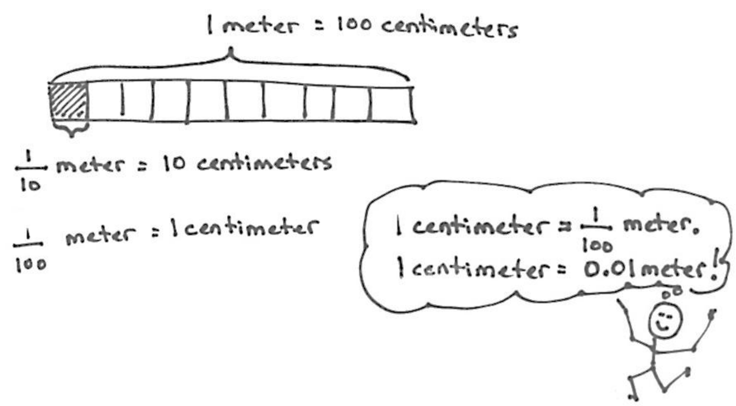
T: (Show centimeters on the meter stick.) A meter is made of 100 centimeters. What fraction of a meter is 1 centimeter?

S: $\frac{1}{100}$ meter.

T: (Write $\frac{1}{100}$ m = 1 cm.) In decimal form, $\frac{1}{100}$ meter can be written as zero point zero one meter. (Write 0.01 m.)

> **NOTES ON MULTIPLE MEANS OF REPRESENTATION:**
>
> Be sure to enunciate *th* at the end of *hundredths* to help English language learners distinguish *hundredths* and *hundreds*. If possible, speak more slowly, pause more frequently, or couple the language with a place value chart. Check for student understanding and correct pronunciation of fraction names.

T: 1 **hundredth** is written as zero point zero one. How do you think we represent $\frac{3}{100}$ meter in decimal form? Talk with your partner, and write your thoughts on your personal white board.



S: 0.03 meter.

T: Yes. $\frac{3}{100}$ meter can be shown as a fraction or in decimal form. (Write $\frac{3}{100}$ m = 0.03 m.)

T: (Show the meter strip of paper.) This 1-meter paper strip is partitioned into 10 equal parts. Let's shade $\frac{1}{10}$ meter. How many centimeters equal $\frac{1}{10}$ meter?

S: 10 centimeters.

T: How many hundredths of a meter equal $\frac{1}{10}$ meter?

S: $\frac{10}{100}$ meter.

T: (Write $\frac{1}{10}$ m = $\frac{10}{100}$ m.) We can write this number as a fraction. We can also write it in decimal form. (Write 0.1 m = 0.10 m.) This (pointing to the latter) is how you express $\frac{10}{100}$ meter as a decimal.

T: Let's decompose $\frac{1}{10}$ meter into 10 smaller units to prove that this number sentence, 0.1 m = 0.10 m, is true. (Partition the tenth into 10 parts.) Is each of these new smaller units $\frac{1}{100}$ meter and 1 centimeter in length?

S: Yes.

T: Explain to your partner why.

Repeat the process by shading the next tenth of the meter. Partition it into hundredths, and have students reason about the truth of the following number sentence: $\frac{2}{10}$ m = $\frac{20}{100}$ m = 0.2 m = 0.20 m.

Problem 2: Name hundredths as tenths and some hundredths, stating the number in fraction and decimal form.

T: (Show the meter strip of paper with 2 tenths shaded.) How many tenths of this meter strip of paper are shaded?

S: $\frac{2}{10}$ meter.

T: Use the tape diagram in tenths template to represent this amount. Lightly shade 2 tenths using a pencil.

T: (Write $\frac{2}{10}$ m + $\frac{5}{100}$ m on the board.) Let's shade in $\frac{5}{100}$ meter more. What will you have to do first in order to shade $\frac{5}{100}$ meter?

S: Partition the next tenth of a meter into 10 equal parts.

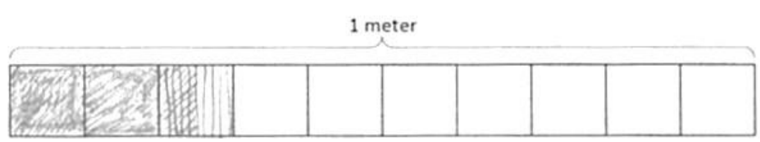
S: (Partition the next tenth meter into 10 equal parts, and shade $\frac{5}{100}$ meter.)

NOTES ON MULTIPLE MEANS FOR ACTION AND EXPRESSION:

Some learners may find partitioning hundredths on the meter strip challenging. Alternatively, have students model with an area model (e.g., a 10 by 10 square partitioned into 100 unit squares). Or, enlarge the template (and tape diagrams on the Problem Set) to ease the task for students working below grade level and others. It may be helpful to use color to help students read hundredths on the Problem Set.

MP.6

T: (Point to the first $\frac{1}{10}$ meter shaded.) How many hundredths of a meter are shaded here?



S: $\frac{10}{100}$ meter.

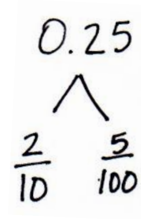
T: (Point to the second $\frac{1}{10}$ meter shaded.) How many hundredths of a meter are shaded here?

S: $\frac{10}{100}$ meter.

T: How many hundredths of a meter are shaded altogether? Explain your thinking.

S: $\frac{25}{100}$ meter. → I see $\frac{10}{100}$ meter in each of the first two parts that were shaded. That is $\frac{20}{100}$ meter. Then, we shaded $\frac{5}{100}$ meter more. $\frac{20}{100}$ m + $\frac{5}{100}$ m = $\frac{25}{100}$ m.

T: (Write 0.25.) 25 hundredths can be written as a decimal in this way.



MP.6

T: (Make a number bond as shown to the right.) So, 25 hundredths is made of 2 tenths and…?

S: 5 hundredths.

T: (Write $\frac{2}{10}+\frac{5}{100}=\frac{25}{100}$.) Explain to your partner why this is true.

S: 2 tenths is the same as 20 hundredths, so it is the same as $\frac{20}{100}+\frac{5}{100}$. → 2 tenths is the same as $\frac{1}{10}+\frac{1}{10}$, and each tenth is $\frac{10}{100}$. So, $\frac{10}{100}+\frac{10}{100}+\frac{5}{100}=\frac{25}{100}$.

Have students continue by writing the total as a decimal and in a number bond to represent the tenths and hundredths fractions that compose the following decimals:

- 28 hundredths
- 31 hundredths
- 41 hundredths
- 79 hundredths

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)

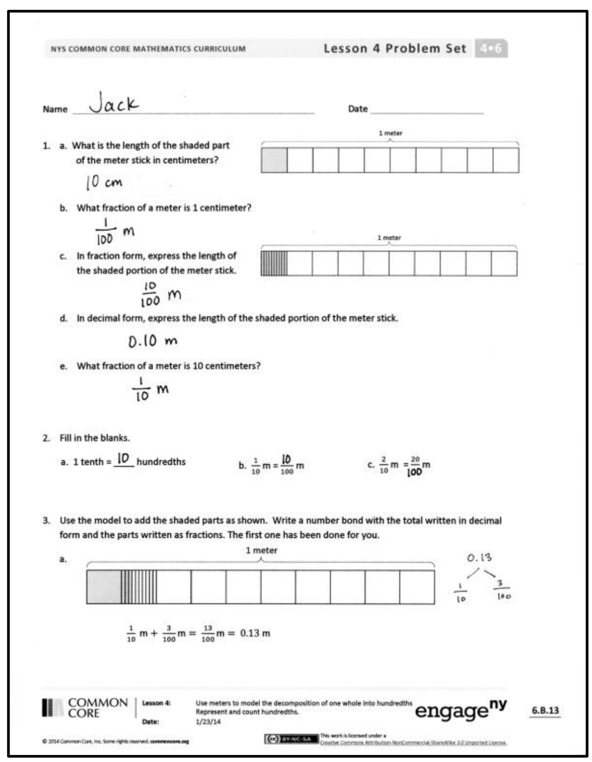
Lesson Objective: Use meters to model the decomposition of one whole into hundredths. Represent and count hundredths.

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.

- In Problem 2(b), you showed that $\frac{1}{10}$ m = $\frac{10}{100}$ m. Write each number in decimal form. What do you notice?


NYS COMMON CORE MATHEMATICS CURRICULUM Lesson 4 Problem Set 4•6

Name Jack Date

1. a. What is the length of the shaded part of the meter stick in centimeters?

10 cm

b. What fraction of a meter is 1 centimeter?

$\frac{1}{100}$ m

c. In fraction form, express the length of the shaded portion of the meter stick.

$\frac{10}{100}$ m

d. In decimal form, express the length of the shaded portion of the meter stick.

0.10 m

e. What fraction of a meter is 10 centimeters?

$\frac{1}{10}$ m

2. Fill in the blanks.

a. 1 tenth = 10 hundredths b. $\frac{1}{10}$ m = $\frac{10}{100}$ m c. $\frac{2}{10}$ m = $\frac{20}{100}$ m

3. Use the model to add the shaded parts as shown. Write a number bond with the total written in decimal form and the parts written as fractions. The first one has been done for you.

a. 1 meter

0.13, $\frac{1}{10}$, $\frac{3}{100}$

$\frac{1}{10}$ m + $\frac{3}{100}$ m = $\frac{13}{100}$ m = 0.13 m

COMMON CORE | Lesson 4: Use meters to model the decomposition of one whole into hundredths Represent and count hundredths. Date: 1/23/14 engage^ny 6.B.13

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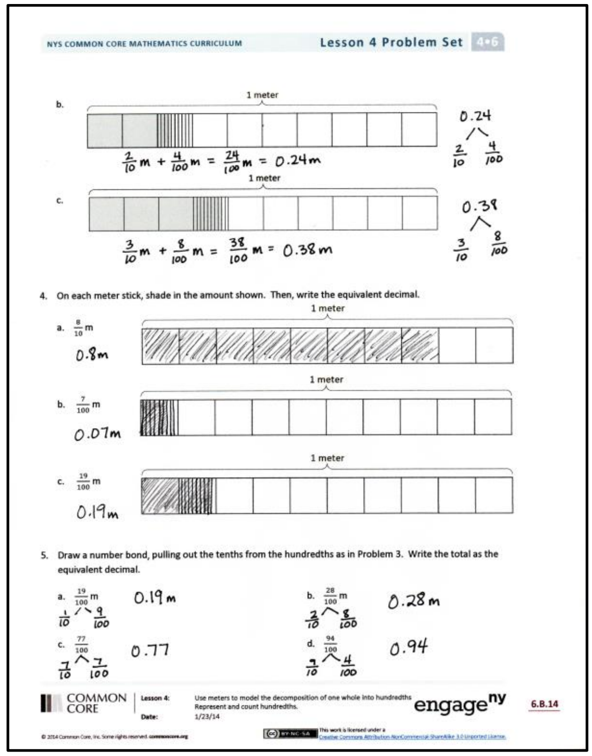
- Look at Problem 4(a). You shaded $\frac{8}{10}$ meter on a tape diagram. Can this be named in any other way? Use a diagram to explain your thinking, and show that number in decimal form.
- Share your number bond for Problem 3(b). How could you write this number bond showing both parts as hundredths? Why is it easier to show as much of the tape diagram as tenths as you can?
- Look at Problem 3(c). Why did we partition the fourth tenth into hundredths but left the first three tenths without partitioning?
- In Problem 5, how did you know how many tenths you could take out of the hundredths to make each number bond? Use a specific example to explain your reasoning.
- How do *hundredths* enable us to measure and communicate more precisely than tenths?
- Explain how hundredths are different from tenths.
- Refer to your solution for the Application Problem, and rename your answer using hundredths.


NYS COMMON CORE MATHEMATICS CURRICULUM Lesson 4 Problem Set 4•6

b. 1 meter

$\frac{2}{10}$m + $\frac{4}{100}$m = $\frac{24}{100}$m = 0.24m

0.24 — $\frac{2}{10}$, $\frac{4}{100}$

c. 1 meter

$\frac{3}{10}$m + $\frac{8}{100}$m = $\frac{38}{100}$m = 0.38m

0.38 — $\frac{3}{10}$, $\frac{8}{100}$

4. On each meter stick, shade in the amount shown. Then, write the equivalent decimal.

a. $\frac{8}{10}$ m 1 meter

0.8m

b. $\frac{7}{100}$ m 1 meter

0.07m

c. $\frac{19}{100}$ m 1 meter

0.19m

5. Draw a number bond, pulling out the tenths from the hundredths as in Problem 3. Write the total as the equivalent decimal.

a. $\frac{19}{100}$ m — $\frac{1}{10}$, $\frac{9}{100}$ 0.19 m

b. $\frac{28}{100}$ m — $\frac{2}{10}$, $\frac{8}{100}$ 0.28 m

c. $\frac{77}{100}$ — $\frac{7}{10}$, $\frac{7}{100}$ 0.77

d. $\frac{94}{100}$ — $\frac{9}{10}$, $\frac{4}{100}$ 0.94

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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: _______

Write Fractions and Decimals

1.	$\frac{2}{10} =$	.
2.	$\frac{3}{10} =$	.
3.	$\frac{4}{10} =$	.
4.	$\frac{8}{10} =$	.
5.	$\frac{6}{10} =$	.
6.	0.1 =	$\frac{}{10}$
7.	0.2 =	$\frac{}{10}$
8.	0.3 =	$\frac{}{10}$
9.	0.7 =	$\frac{}{10}$
10.	0.5 =	$\frac{}{10}$
11.	$\frac{5}{10} =$	.
12.	0.8 =	$\frac{}{10}$
13.	$\frac{7}{10} =$	.
14.	0.4 =	$\frac{}{10}$
15.	$\frac{9}{10} =$	.
16.	$\frac{10}{10} =$	.
17.	$\frac{11}{10} =$	.
18.	$\frac{12}{10} =$	.
19.	$\frac{15}{10} =$	.
20.	$\frac{25}{10} =$	.
21.	$\frac{45}{10} =$	.
22.	$\frac{38}{10} =$	.

23.	1 =	$\frac{}{10}$
24.	2 =	$\frac{}{10}$
25.	5 =	$\frac{}{10}$
26.	4 =	$\frac{}{10}$
27.	4.1 =	$\frac{}{10}$
28.	4.2 =	$\frac{}{10}$
29.	4.6 =	$\frac{}{10}$
30.	2.6 =	$\frac{}{10}$
31.	3.6 =	$\frac{}{10}$
32.	3.4 =	$\frac{}{10}$
33.	2.3 =	$\frac{}{10}$
34.	$4\frac{3}{10} =$	.
35.	$\frac{20}{10} =$	.
36.	1.8 =	$\frac{}{10}$
37.	$3\frac{4}{10} =$	.
38.	$\frac{50}{10} =$	.
39.	4.7 =	$\frac{}{10}$
40.	$2\frac{8}{10} =$	.
41.	$\frac{30}{10} =$	.
42.	3.2 =	$\frac{}{10}$
43.	$\frac{20}{10} =$	.
44.	2.1 =	$\frac{}{10}$

B

Number Correct: _______

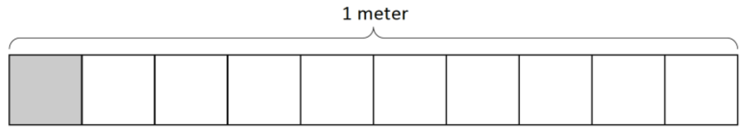
Improvement: _______

Write Fractions and Decimals

1.	$\frac{1}{10}$ =	.		23.	1 =	$\frac{}{10}$
2.	$\frac{2}{10}$ =	.		24.	2 =	$\frac{}{10}$
3.	$\frac{3}{10}$ =	.		25.	4 =	$\frac{}{10}$
4.	$\frac{7}{10}$ =	.		26.	3 =	$\frac{}{10}$
5.	$\frac{5}{10}$ =	.		27.	3.1 =	$\frac{}{10}$
6.	0.2 =	$\frac{}{10}$		28.	3.2 =	$\frac{}{10}$
7.	0.3 =	$\frac{}{10}$		29.	3.6 =	$\frac{}{10}$
8.	0.4 =	$\frac{}{10}$		30.	1.6 =	$\frac{}{10}$
9.	0.8 =	$\frac{}{10}$		31.	2.6 =	$\frac{}{10}$
10.	0.6 =	$\frac{}{10}$		32.	4.2 =	$\frac{}{10}$
11.	$\frac{4}{10}$ =	.		33.	2.5 =	$\frac{}{10}$
12.	0.9 =	$\frac{}{10}$		34.	$3\frac{4}{10}$ =	.
13.	$\frac{6}{10}$ =	.		35.	$\frac{50}{10}$ =	.
14.	0.5 =	$\frac{}{10}$		36.	1.7 =	$\frac{}{10}$
15.	$\frac{9}{10}$ =	.		37.	$4\frac{3}{10}$ =	.
16.	$\frac{10}{10}$ =	.		38.	$\frac{20}{10}$ =	.
17.	$\frac{11}{10}$ =	.		39.	4.6 =	$\frac{}{10}$
18.	$\frac{12}{10}$ =	.		40.	$2\frac{4}{10}$ =	.
19.	$\frac{17}{10}$ =	.		41.	$\frac{40}{10}$ =	.
20.	$\frac{27}{10}$ =	.		42.	2.3 =	$\frac{}{10}$
21.	$\frac{47}{10}$ =	.		43.	$\frac{30}{10}$ =	.
22.	$\frac{34}{10}$ =	.		44.	4.1 =	$\frac{}{10}$

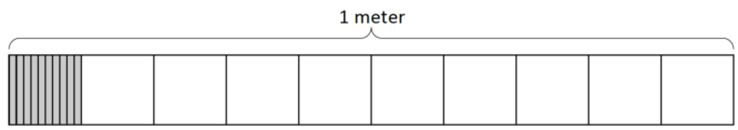
Name ____   Date ____________________

1. a. What is the length of the shaded part of the meter stick in centimeters?



b. What fraction of a meter is 1 centimeter?

c. In fraction form, express the length of the shaded portion of the meter stick.



d. In decimal form, express the length of the shaded portion of the meter stick.

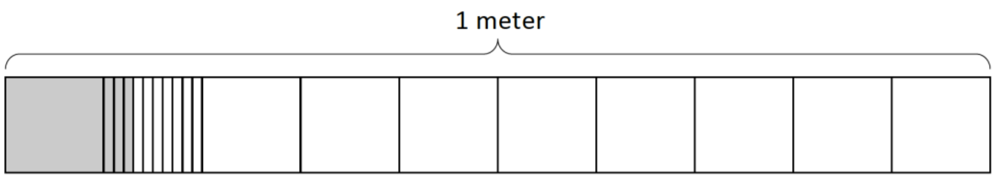
e. What fraction of a meter is 10 centimeters?

2. Fill in the blanks.

a. 1 tenth = _____ hundredths   b. $\frac{1}{10}$ m = $\frac{\_\_}{100}$ m   c. $\frac{2}{10}$ m = $\frac{20}{\_\_}$ m

3. Use the model to add the shaded parts as shown. Write a number bond with the total written in decimal form and the parts written as fractions. The first one has been done for you.

a.

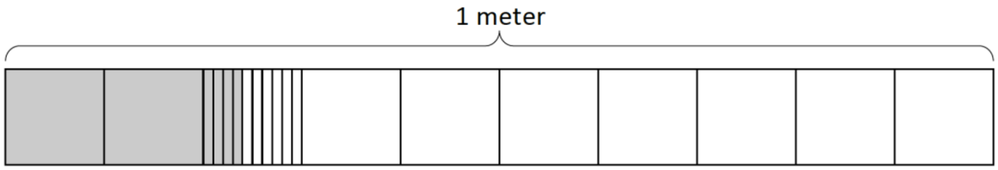


0.13

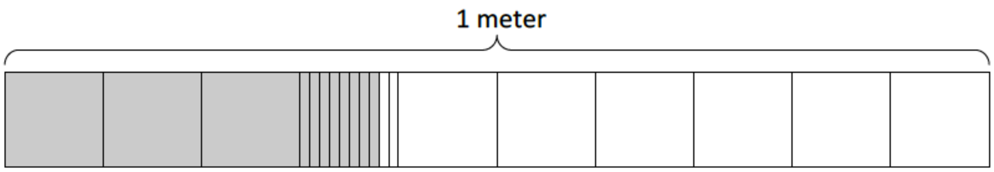
$\frac{1}{10}$ $\frac{3}{100}$

$$\frac{1}{10}\text{ m} + \frac{3}{100}\text{ m} = \frac{13}{100}\text{ m} = 0.13\text{ m}$$

b.

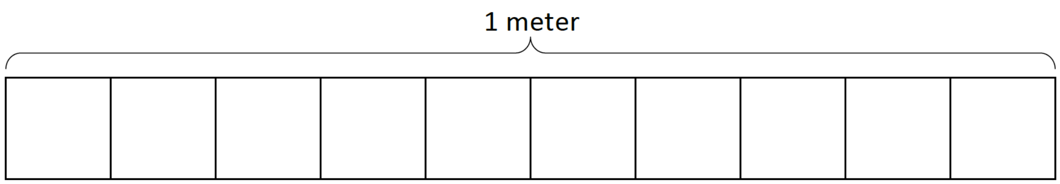


c.

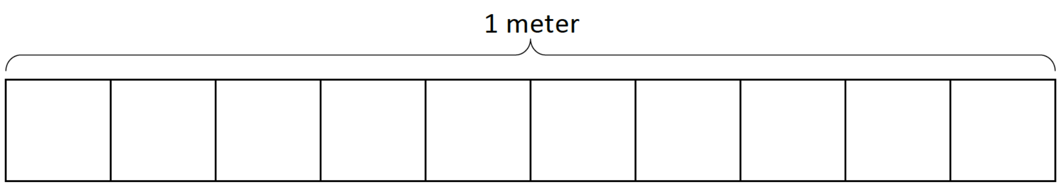


4. On each meter stick, shade in the amount shown. Then, write the equivalent decimal.

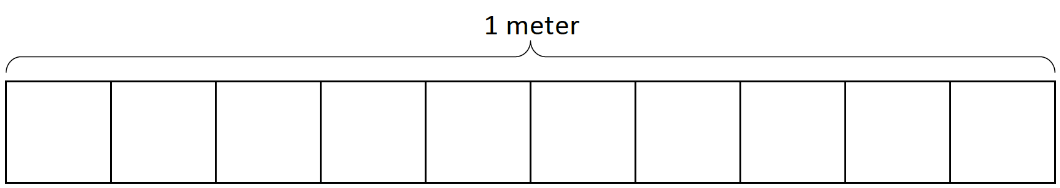
a. $\frac{8}{10}$ m



b. $\frac{7}{100}$ m



c. $\frac{19}{100}$ m



5. Draw a number bond, pulling out the tenths from the hundredths as in Problem 3. Write the total as the equivalent decimal.

a. $\frac{19}{100}$ m

b. $\frac{28}{100}$ m

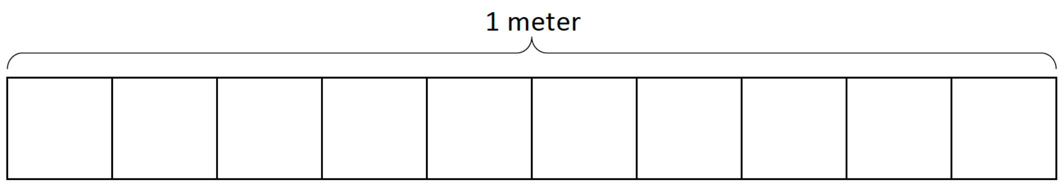
c. $\frac{77}{100}$

d. $\frac{94}{100}$

Name ____ Date ____________________

1. Shade in the amount shown. Then, write the equivalent decimal.

$\frac{6}{10}$ m



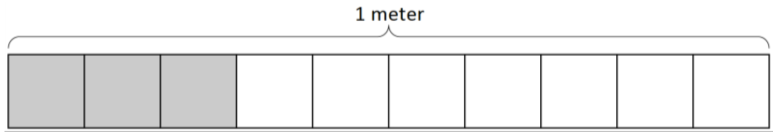
2. Draw a number bond, pulling out the tenths from the hundredths. Write the total as the equivalent decimal.

   a. $\frac{62}{100}$ m

   b. $\frac{27}{100}$

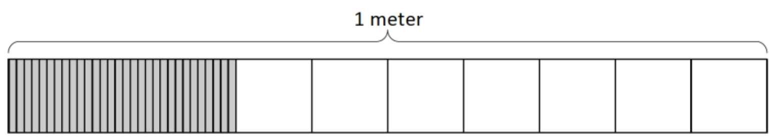
Name ______________________________________ Date ____________________

1. a. What is the length of the shaded part of the meter stick in centimeters?



b. What fraction of a meter is 3 centimeters?

c. In fraction form, express the length of the shaded portion of the meter stick.



d. In decimal form, express the length of the shaded portion of the meter stick.

e. What fraction of a meter is 30 centimeters?

2. Fill in the blanks.

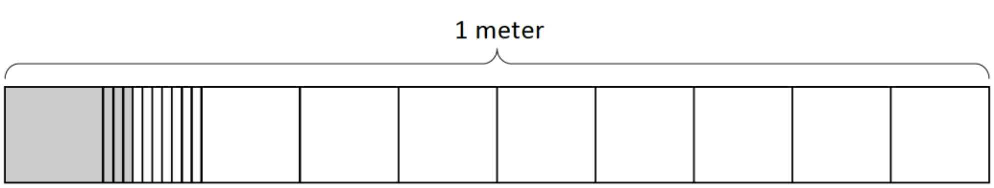
a. 5 tenths = _____ hundredths

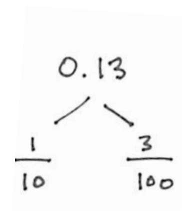
b. $\frac{5}{10}$ m = $\frac{\_\_\_}{100}$ m

c. $\frac{4}{10}$ m = $\frac{40}{\_\_\_}$ m

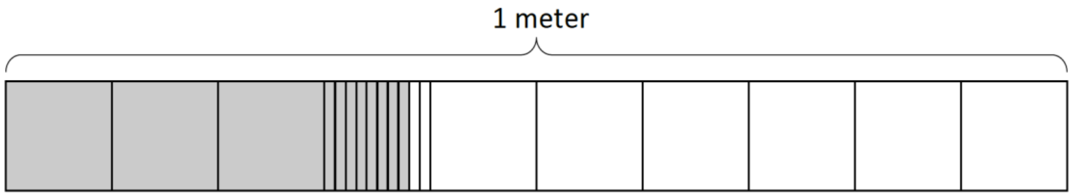
3. Use the model to add the shaded parts as shown. Write a number bond with the total written in decimal form and the parts written as fractions. The first one has been done for you.

a.

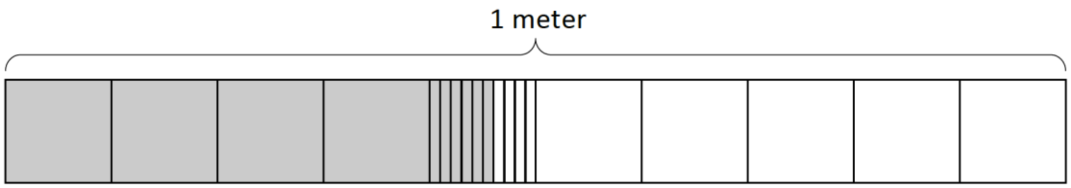




$\frac{1}{10}$ m + $\frac{3}{100}$ m = $\frac{13}{100}$ m = 0.13 m b.

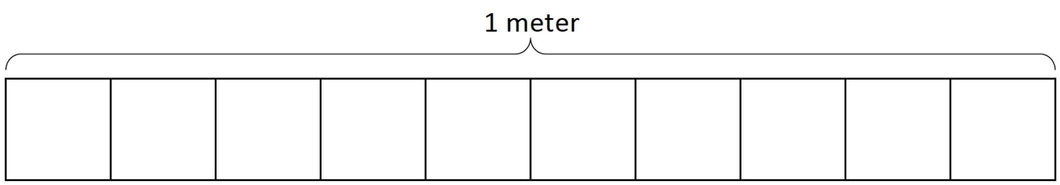


c.

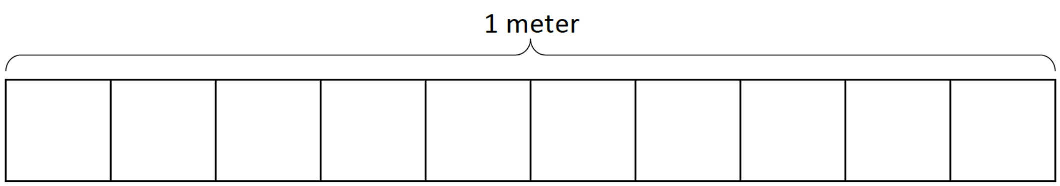


4. On each meter stick, shade in the amount shown. Then, write the equivalent decimal.

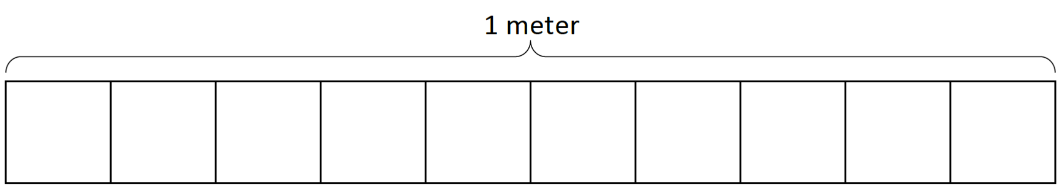
a. $\frac{9}{10}$ m



b. $\frac{15}{100}$ m



c. $\frac{41}{100}$ m



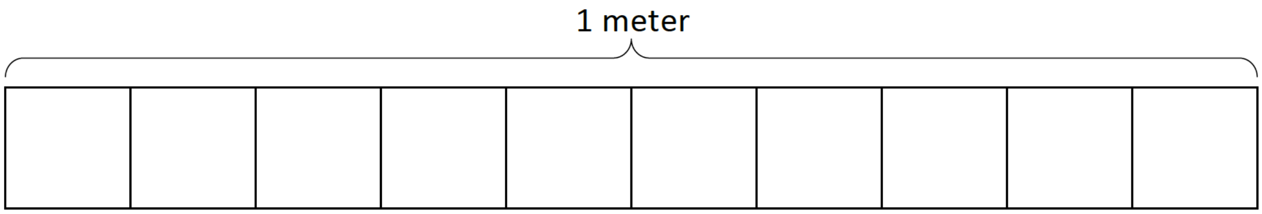
5. Draw a number bond, pulling out the tenths from the hundredths, as in Problem 3 of the Homework. Write the total as the equivalent decimal.

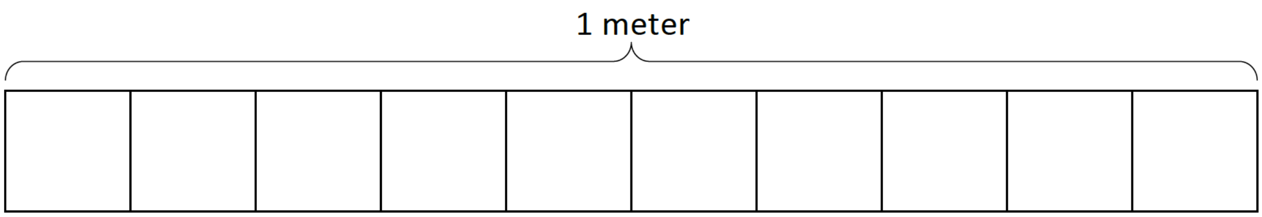
a. $\frac{23}{100}$ m

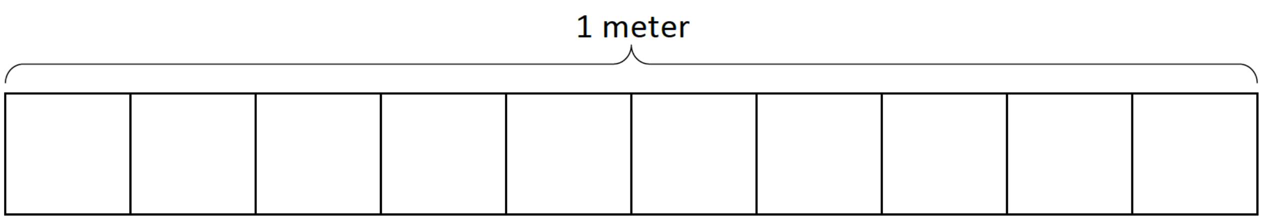
b. $\frac{38}{100}$ m

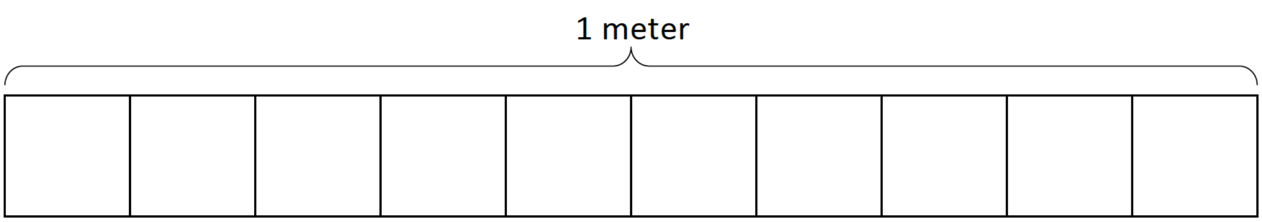
c. $\frac{82}{100}$

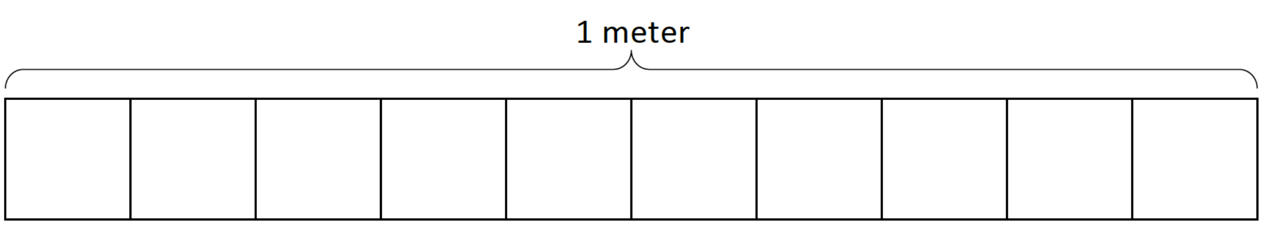
d. $\frac{76}{100}$











tape diagram in tenths