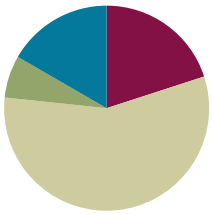
Lesson 2

Objective: Use metric measurement and area models to represent tenths as fractions greater than 1 and decimal numbers.

Suggested Lesson Structure

Fluency Practice	(12 minutes)
Application Problem	(4 minutes)
Concept Development	(34 minutes)
Student Debrief	(10 minutes)
Total Time	**(60 minutes)**



Fluency Practice (12 minutes)

- Divide by 10 **4.NF.6** (4 minutes)
- Write the Decimal or Fraction **4.NF.6** (3 minutes)
- Count by Tenths **4.NF.6** (5 minutes)

Divide by 10 (4 minutes)

Materials: (S) Personal white board

Note: This fluency activity reviews Lesson 1.

T: (Project a tape diagram with a value of 100 partitioned into 10 units.) Say the whole.
S: 100.
T: How many units is 100 divided into?
S: 10.
T: Say the division sentence.
S: 100 ÷ 10 = 10.
T: (Write 10 inside each unit. Write 100 ÷ 10 = 10 beneath the diagram.)
T: (Write 10 ÷ 10.) Draw a tape diagram showing 10 ÷ 10.
S: (Draw a tape diagram partitioned into 10 units. Write 10 at the top. Write 1 inside each unit. Beneath the tape diagram, write 10 ÷ 10 = 1.)

Write the Decimal or Fraction (3 minutes)

Materials: (S) Personal white board

Note: This fluency activity reviews Lesson 1.

T: (Write $\frac{1}{10}$.) Say the fraction.

S: 1 tenth.

T: (Write $\frac{1}{10}$ = __.__.) Complete the number sentence.

S: (Write $\frac{1}{10}$ = 0.1.)

Continue with the following possible sequence: $\frac{2}{10}$, $\frac{7}{10}$, and $\frac{9}{10}$.

T: (Write 0.3 = —.) Complete the number sentence.

S: (Write 0.3 = $\frac{3}{10}$.)

Continue with the following possible sequence: 0.4, 0.8, and 0.6.

T: (Write $\frac{10}{10}$.) Say the fraction.

S: 10 tenths.

T: Complete the number sentence, writing 10 tenths as a whole number.

S: (Write $\frac{10}{10}$ = 1.)

Count by Tenths (5 minutes)

Note: This fluency activity reviews Lesson 1.

T: Count by ones to 10, starting at zero.

S: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10.

T: Count by tenths to 10 tenths, starting at zero tenths.

S: $\frac{0}{10}$, $\frac{1}{10}$, $\frac{2}{10}$, $\frac{3}{10}$, $\frac{4}{10}$, $\frac{5}{10}$, $\frac{6}{10}$, $\frac{7}{10}$, $\frac{8}{10}$, $\frac{9}{10}$, $\frac{10}{10}$.

T: 1 one is the same as how many tenths?

S: 10 tenths.

T: Let's count to 10 tenths again. This time, when you come to 1, say one.

S: $\frac{0}{10}$, $\frac{1}{10}$, $\frac{2}{10}$, $\frac{3}{10}$, $\frac{4}{10}$, $\frac{5}{10}$, $\frac{6}{10}$, $\frac{7}{10}$, $\frac{8}{10}$, $\frac{9}{10}$, 1.

T: Count by tenths again. This time, stop when I raise my hand.

S: $\frac{0}{10}$, $\frac{1}{10}$, $\frac{2}{10}$, $\frac{3}{10}$.

T: (Raise hand.) Say 3 tenths using digits. For example, 1 tenth would be said as zero point one.

S: Zero point three.

T: Continue counting using fraction form.

S: $\frac{4}{10}, \frac{5}{10}, \frac{6}{10}, \frac{7}{10}$.

T: (Raise hand.) Say 7 tenths using digits.

S: Zero point seven.

T: Continue counting in fraction form.

S: $\frac{8}{10}, \frac{9}{10}$, 1.

Use the same process to count down to zero tenths.

T: Count by twos to 10 starting at zero.

S: 0, 2, 4, 6, 8, 10.

T: Count by 2 tenths to 10 tenths, starting at zero.

S: $\frac{0}{10}, \frac{2}{10}, \frac{4}{10}, \frac{6}{10}, \frac{8}{10}, \frac{10}{10}$.

T: Count by 2 tenths again. This time, when you come to the whole number, say it.

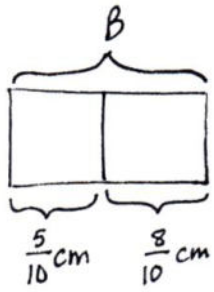
S: $\frac{0}{10}, \frac{2}{10}, \frac{4}{10}, \frac{6}{10}, \frac{8}{10}$, 1.

T: Count backward by 2 tenths, starting at 1.

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

Application Problem (4 minutes)

Yesterday, Ben's bamboo plant grew 0.5 centimeter. Today it grew another $\frac{8}{10}$ centimeter. How many centimeters did Ben's bamboo plant grow in 2 days?



$0.5 = \frac{5}{10}$

$\frac{5}{10} + \frac{8}{10} = \frac{13}{10} = 1\frac{3}{10}$

$B = 1\frac{3}{10}$ cm

Ben's bamboo plant grew $1\frac{3}{10}$ centimeters in 2 days.

Note: This Application Problem builds from Module 5, in which students added fractions with like units. To do so, students use what they learned in Lesson 1 to convert a decimal number to fraction form to add.

Concept Development (34 minutes)

Materials: (T) Centimeter ruler, tenths area model (Template), document camera (S) Centimeter ruler, pencil, blank paper, tenths area model (Template), personal white board

Problem 1: Draw line segments of given lengths, and express each segment as a mixed number and a decimal.

T: (Place a centimeter ruler under the document camera. If a document camera is unavailable, circulate to check students' work.) Using your pencil and ruler, draw a line that measures 2 centimeters. (Write 2 cm on the board.)

S: (Draw a line with the length of 2 centimeters.)

T: Extend the line 6 tenths centimeter.

S: (Extend the 2 centimeters line by 6 tenths centimeter.)

T: How many centimeters did you draw initially?

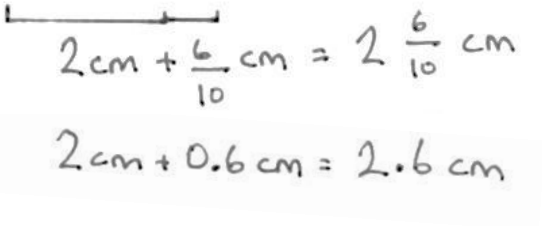
S: 2 centimeters.

T: (Label 2 cm below the line, as pictured to the right.)

T: How many tenths of a centimeter did you draw after drawing 2 centimeters?

S: 6 tenths centimeter.

T: (Label $\frac{6}{10}$ centimeter. Complete the expression 2 cm + $\frac{6}{10}$ cm below the line, as pictured to the right.)



T: Record a number sentence showing the total length of your line as a mixed number.

S: (Write 2 cm + $\frac{6}{10}$ cm = $2\frac{6}{10}$ cm.)

T: Let's rewrite this expression in decimal form. (Write 2 cm + 0.6 cm = 2.6 cm.) Rewrite your fraction addition in decimal form, and explain to your partner the relationship between the two number sentences and the line you drew. (Allow students time to work.)

T: $2\frac{6}{10}$ cm is written in decimal form like this: 2.6 cm. We read this as 2 and 6 tenths centimeters.

Repeat the process as necessary with $3\frac{5}{10}$ cm and $4\frac{8}{10}$ cm. Next, call out lengths verbally (e.g., 1 and 5 tenths centimeters). Students quickly draw the line and write the corresponding length in mixed number and decimal form. Suggested sequence: 1.5 cm, 5.4 cm, 3.9 cm, 9.6 cm, and 8.1 cm.

NOTES ON MULTIPLE MEANS OF REPRESENTATION:

Some learners may benefit from using a large print or tactile ruler that has raised lines for every centimeter. Consider adhering dried glue or rubber bands to student rulers to help learners with low vision gauge the centimeter and millimeter measures. Another possibility is providing hand-held magnifying lenses.

Problem 2: Use the area model to represent tenths as fractions greater than 1 and as decimal numbers.

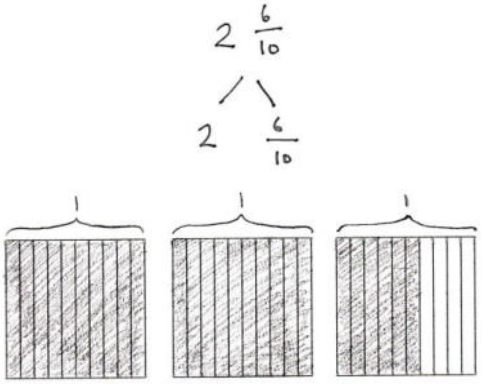
MP.2

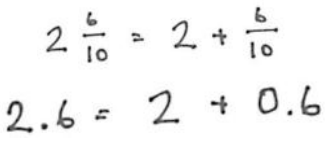
T: (Cover up the ruler to show only 1 cm.) How many tenths are in 1?

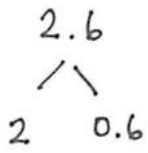
S: 10 tenths.

MP.2

T: (Reveal another centimeter, showing 2 cm.) How many tenths are in 2?
S: 20 tenths.
T: (Reveal 2.6 cm.) How many tenths are in 2 and 6 tenths?
S: 26 tenths.
T: Express 26 tenths in fraction form.
S: (Write $\frac{26}{10}$.)
T: (Write $\frac{20}{10}$ cm + $\frac{6}{10}$ cm = $\frac{26}{10}$ cm.)
T: (Place the tenths area model template in a personal white board as students do the same, turn the board horizontally, and project it with a document camera.) How many rectangles are on your template?
S: 5 rectangles.
T: Each rectangle represents 1 one. How many ones do we have?
S: 5 ones.
T: Each rectangle has been partitioned equally. How many tenths are there in all?
S: 50 tenths.
T: (Write $2\frac{6}{10}$.)
T: How many ones are in this number?
S: 2 ones.
T: (Begin showing the number bond, taking out 2.) Shade in 2 ones.
S: (Shade in 2 rectangles.)
T: How many tenths do we still need to shade in?
S: 6 tenths.
T: (Complete the number bond by writing $\frac{6}{10}$.) Shade in 6 tenths more.
T: (As students are shading their template, write $2\frac{6}{10} = 2 + \frac{6}{10}$.)
T: With your partner, rewrite $2 + \frac{6}{10}$, using decimal form to add the tenths.
S: (Write 2 + 0.6.)
T: 2 + 0.6 can be written as …?
S: 2 point 6.
T: (Write 2.6 = 2 + 0.6.) With your partner, draw a number bond, this time using decimal form.







Students erase their templates. Continue the process with $2\frac{7}{10}$, $2\frac{2}{10}$, $3\frac{2}{10}$, $\frac{31}{10}$, $\frac{48}{10}$, and $\frac{26}{10}$. When appropriate, conclude each experience by asking how many more are needed to get to the next whole number, as demonstrated as follows:

T: You just shaded $3\frac{2}{10}$ and wrote this mixed number as 3 + 0.2 = 3.2. Look at your area model. How many tenths do you need to get to 4 ones?

S: 8 tenths.

T: How do you know?

S: I looked at the area model and saw that 8 tenths more have to be shaded in to complete one whole. → 2 tenths plus 8 tenths equals 10 tenths, and that makes one whole.

T: Express 8 tenths as a fraction and decimal.

With the final two or three examples, extend the question by asking how many more tenths are needed to get to 5.

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)

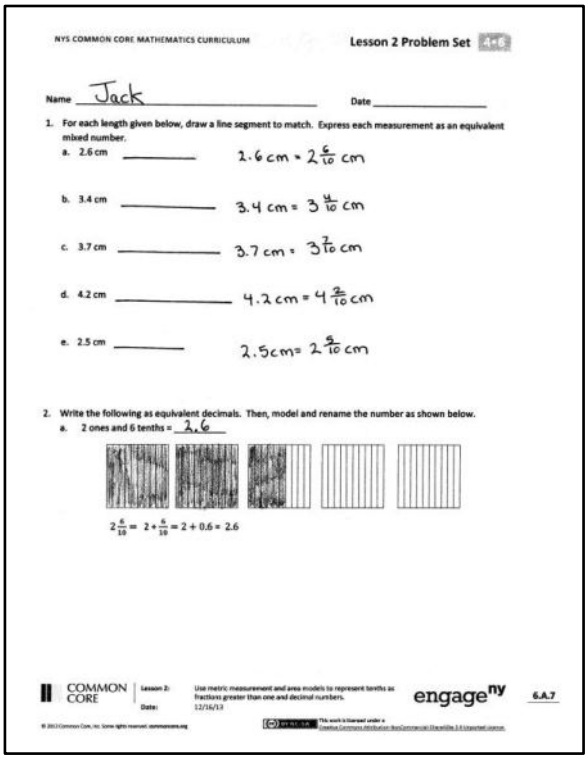
Lesson Objective: Use metric measurement and area models to represent tenths as fractions greater than 1 and decimal numbers.

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 2(a). What do you notice? How could you apply what you did in Problem 2(a) to Problem 1(a)? Are there other similarities within Problems 1 and 2?
- Look at Problem 2(e). How did you know how much of the rectangles to shade in? What is the most efficient way to determine how many rectangles you would need to shade in?



NYS COMMON CORE MATHEMATICS CURRICULUM Lesson 2 Problem Set 4•6

Name Jack Date

1. For each length given below, draw a line segment to match. Express each measurement as an equivalent mixed number.
   a. 2.6 cm — 2.6 cm = $2\frac{6}{10}$ cm
   b. 3.4 cm — 3.4 cm = $3\frac{4}{10}$ cm
   c. 3.7 cm — 3.7 cm = $3\frac{7}{10}$ cm
   d. 4.2 cm — 4.2 cm = $4\frac{2}{10}$ cm
   e. 2.5 cm — 2.5cm = $2\frac{5}{10}$ cm

2. Write the following as equivalent decimals. Then, model and rename the number as shown below.
   a. 2 ones and 6 tenths = 2.6

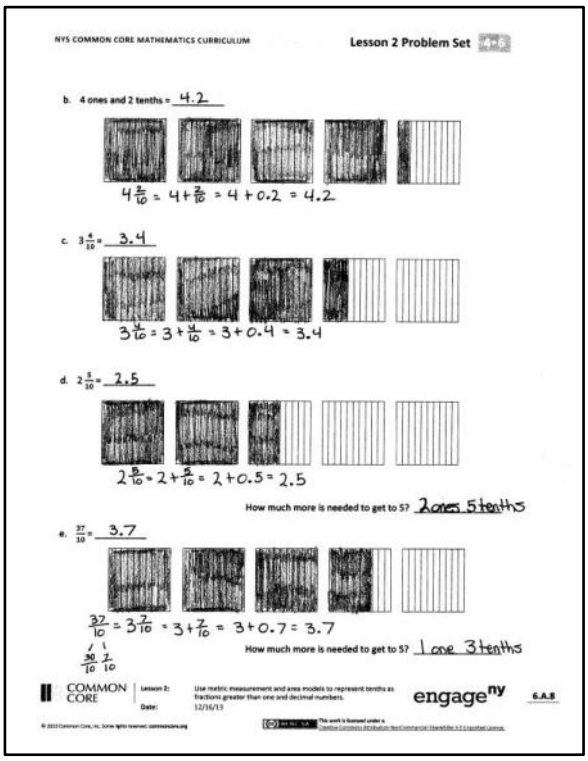
$2\frac{6}{10} = 2 + \frac{6}{10} = 2 + 0.6 = 2.6$

COMMON CORE Lesson 2: Date: Use metric measurement and area models to represent tenths as fractions greater than one and decimal numbers. 12/16/13 engage^ny 6.A.7

- Look at Problem 2(e) with your partner. Explain to each other how you decided how much more is needed to get to 5.
- How did the Application Problem connect to today's lesson with decimal fractions?

Exit Ticket (3 minutes)

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help with assessing the 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.



NYS COMMON CORE MATHEMATICS CURRICULUM Lesson 2 Problem Set 4•6

b. 4 ones and 2 tenths = 4.2

$4\frac{2}{10} = 4 + \frac{2}{10} = 4 + 0.2 = 4.2$

c. $3\frac{4}{10} =$ 3.4

$3\frac{4}{10} = 3 + \frac{4}{10} = 3 + 0.4 = 3.4$

d. $2\frac{5}{10} =$ 2.5

$2\frac{5}{10} = 2 + \frac{5}{10} = 2 + 0.5 = 2.5$

How much more is needed to get to 5? 2 ones 5 tenths

e. $\frac{37}{10} =$ 3.7

$\frac{37}{10} = 3\frac{7}{10} = 3 + \frac{7}{10} = 3 + 0.7 = 3.7$

How much more is needed to get to 5? 1 one 3 tenths

$\frac{30}{10}$ $\frac{7}{10}$

COMMON CORE | Lesson 2: Use metric measurement and area models to represent tenths as fractions greater than one and decimal numbers. Date: 12/16/13 engage^ny 6.A.8

Name _____ Date _____

1. For each length given below, draw a line segment to match. Express each measurement as an equivalent mixed number.

   a. 2.6 cm

   b. 3.4 cm

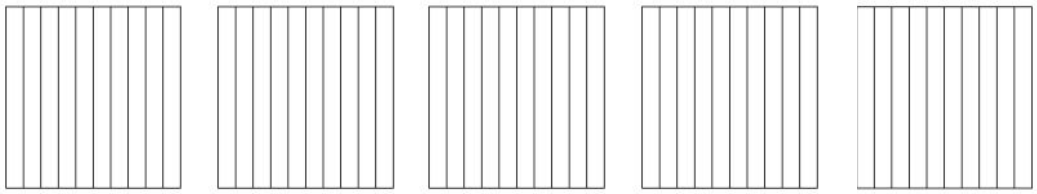
   c. 3.7 cm

   d. 4.2 cm

   e. 2.5 cm

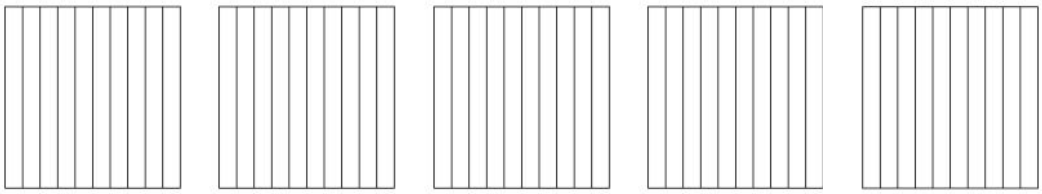
2. Write the following as equivalent decimals. Then, model and rename the number as shown below.

   a. 2 ones and 6 tenths = _____

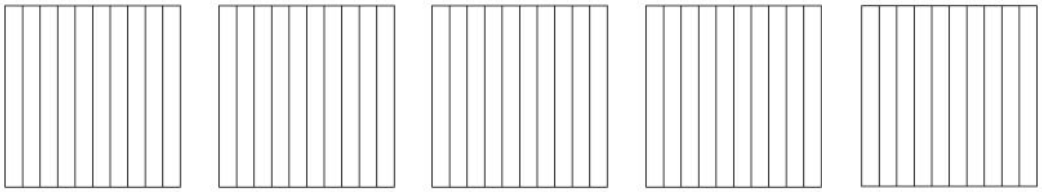


$2\frac{6}{10} = 2 + \frac{6}{10} = 2 + 0.6 = 2.6$

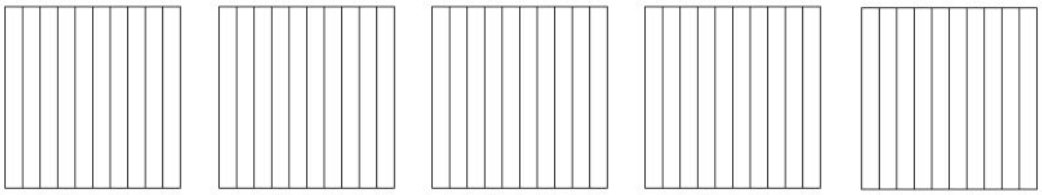
b. 4 ones and 2 tenths = _____



c. $3\frac{4}{10}$ = _____

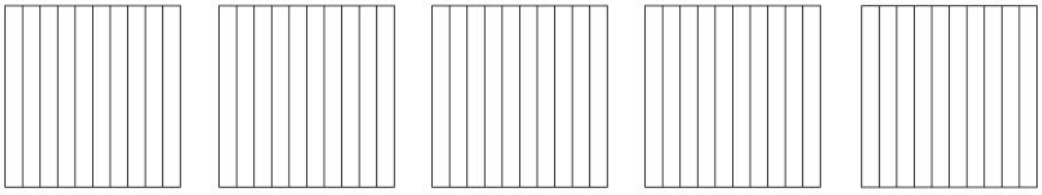


d. $2\frac{5}{10}$ = _____



How much more is needed to get to 5? _____

e. $\frac{37}{10}$ = _____



How much more is needed to get to 5? _____

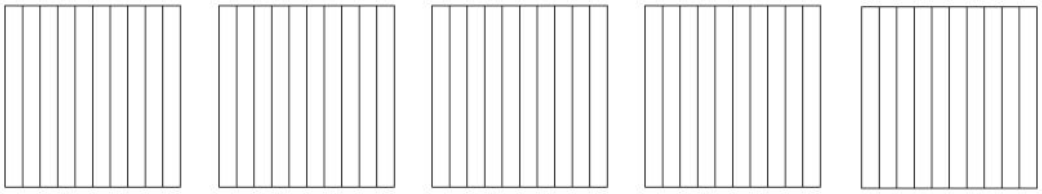
Name _____ Date _____

1. For the length given below, draw a line segment to match. Express the measurement as an equivalent mixed number.

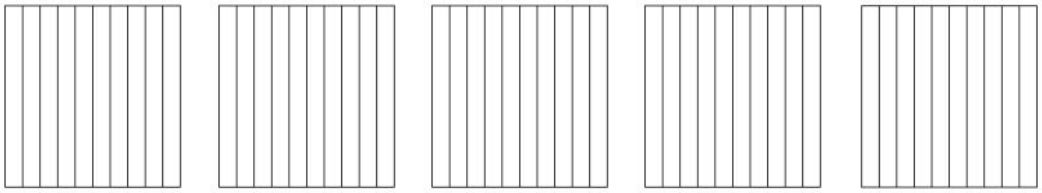
   4.8 cm

2. Write the following in decimal form and as a mixed number. Shade the area model to match.

   a. 3 ones and 7 tenths = _____ = _____



   b. $\frac{24}{10}$ = _____= _____



How much more is needed to get to 5? _____

Name _____ Date _____

1. For each length given below, draw a line segment to match. Express each measurement as an equivalent mixed number.

   a. 2.6 cm

   b. 3.5 cm

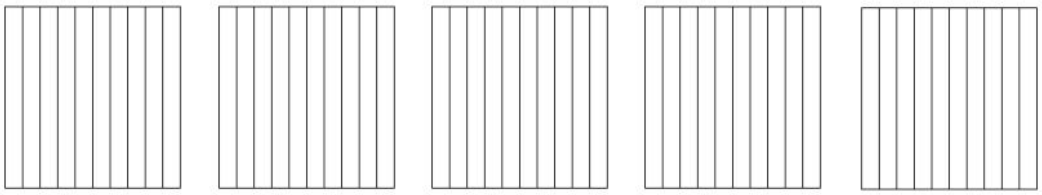
   c. 1.7 cm

   d. 4.3 cm

   e. 2.2 cm

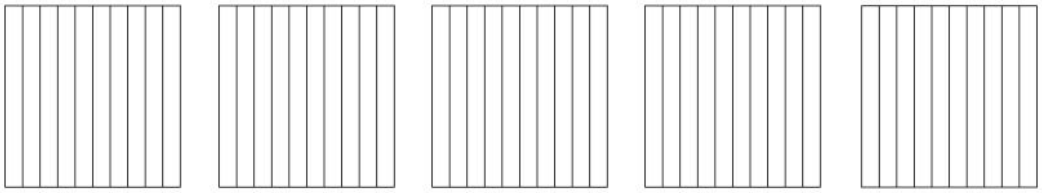
2. Write the following in decimal form. Then, model and rename the number as shown below.

   a. 2 ones and 4 tenths = _____

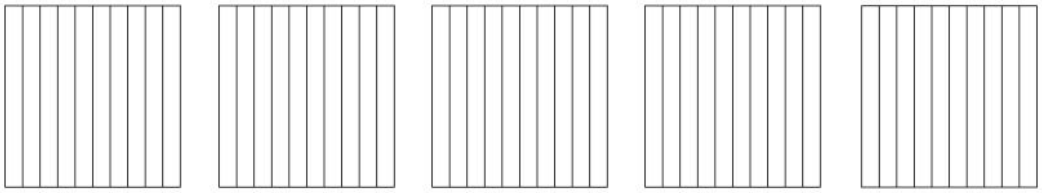


$2\frac{4}{10} = 2 + \frac{4}{10} = 2 + 0.4 = 2.4$

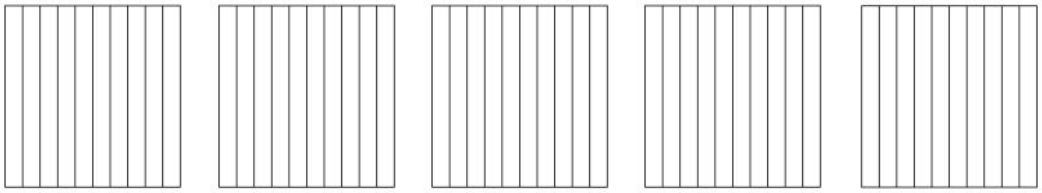
b. 3 ones and 8 tenths = _____



c. $4\frac{1}{10}$ = _____

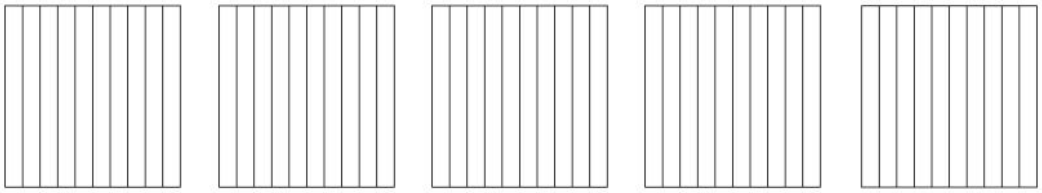


d. $1\frac{4}{10}$ = _____

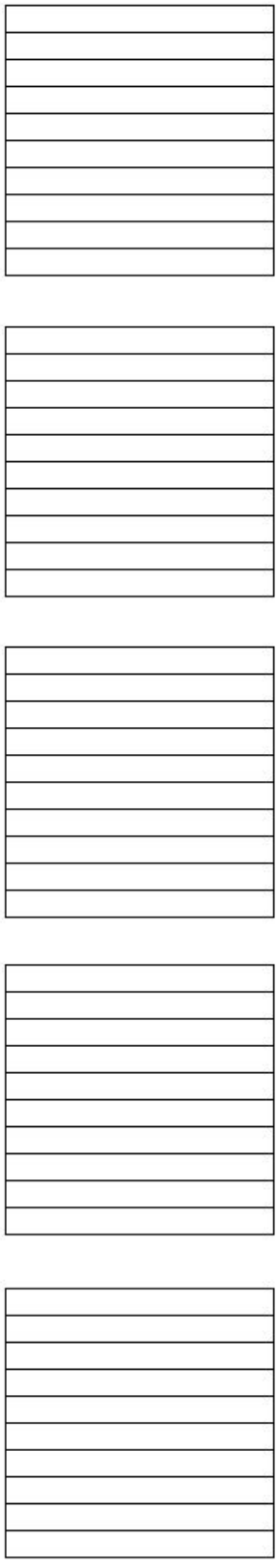


How much more is needed to get to 5? _____

e. $\frac{33}{10}$ = _____



How much more is needed to get to 5? _____



tenths area model