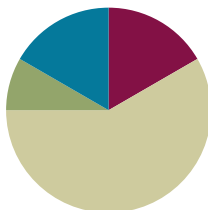


Lesson 3

Objective: Represent mixed numbers with units of tens, ones, and tenths with place value disks, on the number line, and in expanded form.

Suggested Lesson Structure

■ Fluency Practice	(10 minutes)
■ Application Problem	(5 minutes)
■ Concept Development	(35 minutes)
■ Student Debrief	(10 minutes)
Total Time	(60 minutes)



Fluency Practice (10 minutes)

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

Write the Decimal or Fraction (5 minutes)

Materials: (S) Personal white board

Note: This fluency activity reviews Lessons 1–2.

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

S: 1 tenth.

T: (Write $\frac{1}{10} = \underline{\quad}.\underline{\quad}$.) Write 1 tenth as a decimal to 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 $0.3 = \underline{\quad}$.) Write zero point three as a fraction to 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 $\frac{10}{10}$.) 10 tenths equals what whole number?

S: 1.

T: (Write $\frac{10}{10} = 1$. Beneath it, write $\frac{30}{10}$.) How many ones is 30 tenths?

S: 3 ones.

T: (Write $\frac{50}{10}$.) How many ones is 50 tenths?

S: 5 ones.

T: (Write $\frac{13}{10}$.) Write 13 tenths as a mixed number.

S: (Write $\frac{13}{10} = 1 \frac{3}{10}$.)

T: (Write $\frac{13}{10} = 1 \frac{3}{10} = \underline{\quad}.\underline{\quad}$.) Write $1 \frac{3}{10}$ in decimal form.

S: (Write $\frac{13}{10} = 1 \frac{3}{10} = 1.3$.)

Continue with the following possible sequence: $\frac{17}{10}$, $\frac{37}{10}$, $\frac{34}{10}$, and $\frac{49}{10}$.

T: (Write 2.1.) Write two point one as a mixed number.

S: (Write $2.1 = 2 \frac{1}{10}$.)

Continue with the following possible sequence: 3.1, 5.1, 5.9, and 1.7.

Count by Tenths (5 minutes)

Materials: (T) Personal white board

Note: This fluency activity reviews Lessons 1–2.

T: Count by fives to 50, starting at zero.

$\frac{0}{10}$	$\frac{5}{10}$	$\frac{10}{10}$	$\frac{15}{10}$	$\frac{20}{10}$	$\frac{25}{10}$	$\frac{30}{10}$	$\frac{35}{10}$	$\frac{40}{10}$	$\frac{45}{10}$	$\frac{50}{10}$
0		1		2		3		4		5

S: 0, 5, 10, 15, 20, 25, 30, 35, 40, 45, 50.

T: Count by 5 tenths to 50 tenths, starting at 0 tenths. (Write as students count.)

S: $\frac{0}{10}$, $\frac{5}{10}$, $\frac{10}{10}$, $\frac{15}{10}$, $\frac{20}{10}$, $\frac{25}{10}$, $\frac{30}{10}$, $\frac{35}{10}$, $\frac{40}{10}$, $\frac{45}{10}$, $\frac{50}{10}$.

T: 1 is the same as how many tenths?

S: 10 tenths.

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

Continue the process, identifying the number of tenths in 2, 3, 4, and 5.

T: Let's count by 5 tenths again. This time, when you come to a whole number, say the whole number. Try not to look at the board.

S: $\frac{0}{10}$, $\frac{5}{10}$, 1, $\frac{15}{10}$, 2, $\frac{25}{10}$, 3, $\frac{35}{10}$, 4, $\frac{45}{10}$, 5.

T: Count backward by 5 tenths, starting at 5.

S: $5, \frac{45}{10}, 4, \frac{35}{10}, 3, \frac{25}{10}, 2, \frac{15}{10}, 1, \frac{5}{10}, \frac{0}{10}$.

T: Count by 5 tenths again. This time, stop when I raise my hand.

S: $\frac{0}{10}, \frac{5}{10}, 1, \frac{15}{10}$.

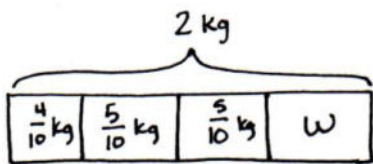
T: (Raise hand.) Say 15 tenths using digits.

S: One point five.

Continue the process counting up to 5 and down from 5, asking students to say the improper fractions using digits.

Application Problem (5 minutes)

Ed bought 4 pieces of salmon weighing a total of 2 kilograms. One piece weighed $\frac{4}{10}$ kg, and two of the pieces weighed $\frac{5}{10}$ kg each. What was the weight of the fourth piece of salmon?



The 4th piece of salmon weighed $\frac{6}{10}$ kg.

Solution A

$$\frac{4}{10} + \frac{5}{10} + \frac{5}{10} = 1 \frac{4}{10}$$

$$2 - 1 \frac{4}{10} = \frac{6}{10}$$

$w = \frac{6}{10}$ kg

Solution B

$$\frac{5}{10} \text{ kg} + \frac{5}{10} \text{ kg} = 1 \text{ kg}$$

$$1 \frac{4}{10} \text{ kg} \xrightarrow{+ \frac{6}{10} \text{ kg}} 2 \text{ kg}$$

$$w = \frac{6}{10} \text{ kg}$$

Note: This Application Problem anticipates decimal fraction addition and reinforces the concept of how many more to make one.

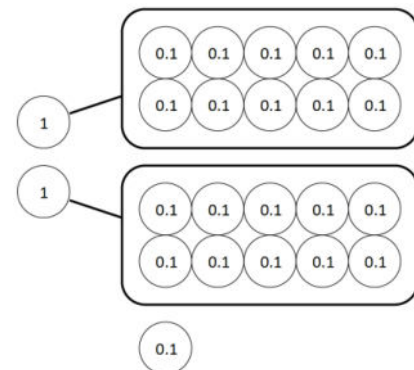
Concept Development (35 minutes)

Materials: (T/S) Whole number place value disks (tens and ones), decimal place value disks (tenths), personal white board, tenths on a number line (Template)

Problem 1: Make groups of 10 tenths to rename as ones. Write the number in decimal form.


T: With a partner, use place value disks to show 21 units of 1 tenth in five-group formation.

S: (Lay out 21 disks, all tenths, in five-group formation, as shown.)



- T: Talk with your partner. Is there any way we can use *fewer* disks to show this same value?
- S: We can bundle 10 tenths to make one. → There are 2 groups of 10 tenths, so we can show 21 tenths as 2 ones 1 tenth. → In the five-groups, I can see 2 groups of 10 disks. 10 tenths is 1 whole. We have 1 (circling group with finger), 2 (circling group with finger) groups that make 2 ones, and then 1 tenth (touching final 0.1 disk.)
- T: Let's group 10 tenths together and trade them for...?
- S: 1 one.
- T: How many times can we do this?
- S: 1 more time. → 2 times.
- T: What disks do we have now?
- S: 2 ones and 1 tenth.
- T: Express this number in decimal form.
- S: (Write 2.1.)
- T: How many more tenths would we have needed to have 3 ones?
- S: 9 tenths more. → 0.9.

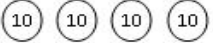
Repeat the process using disks to model 17 tenths. Then, continue the process having the students draw disks for 24 tenths. Have students circle the disks being bundled.


 **NOTES ON MULTIPLE MEANS FOR ACTION AND EXPRESSION:**

Be sure to enunciate /th/ at the end of *tenths* to help English language learners distinguish *tenths* and *tens*. Try to speak more slowly, pause more frequently, or couple language with a tape diagram. Check for student understanding and correct pronunciation of fraction names.

Problem 2: Represent mixed numbers with units of tens, ones, and tenths in expanded form.

- T: Hold up a place value disk with a value of 1 ten. We say the value of this disk is...?
- S: 1 ten. → Ten.
- T: (Draw or show 4 tens disks.) The total value of 4 of these is...?
- S: 4 tens. → Forty.
- T: 4 tens written as a multiplication expression is?
- S: 4×1 ten. → 4×10 .
- T: (Write the expression below the disks, as pictured to the right.) 4×10 is...?
- S: 40.
- T: (Complete the number sentence. Draw or show 2 ones disks.) The total value of these 2 disks is...?
- S: 2 ones. → Two.
- T: 2 ones written as a multiplication expression is...?
- S: 2×1 .
- T: (Write the expression below the disks, as pictured to the right.) $(4 \times 10) + (2 \times 1)$ is...?
- S: 42.


 $4 \times 10 = 40$


 $(4 \times 10) + (2 \times 1) = 42$

MP.4

T: (Complete the number sentence. Draw or show a tenth disk.) This place value disk says zero point one on it. We say the value of this disk is...?

S: 1 tenth.



T: (Draw or show 6 one-tenth disks in five-group formation.) The total value of 6 of these disks is ...?



$$(4 \times 10) + (2 \times 1) + (6 \times \frac{1}{10}) = 42 \frac{6}{10}$$

S: 6 tenths.

T: 6 tenths written as a multiplication expression is...?

$$(4 \times 10) + (2 \times 1) + (6 \times 0.1) = 42.6$$

S: $6 \times \frac{1}{10}$.

T: (Write the expression below the disks, as pictured above.) Discuss the total value of the number represented by the disks with your partner.

S: Do what is in the parentheses first, and then find the sum. $40 + 2 + \frac{6}{10}$ is $42 \frac{6}{10}$. \rightarrow 4 tens, 2 ones, 6 tenths. \rightarrow It is like expanded form.

T: We have written $42 \frac{6}{10}$ in expanded form, writing each term as a multiplication expression. Just like with whole numbers, the expanded form allows us to see the place value unit for each digit.

T: (Point to $(4 \times 10) + (2 \times 1) + (6 \times \frac{1}{10}) = 42 \frac{6}{10}$.) Talk with your partner. How could you write this using **decimal expanded form** instead of **fraction expanded form**? Explain how you know.

S: (Work with partners, and write $(4 \times 10) + (2 \times 1) + (6 \times 0.1) = 42.6$.) I know that 1 tenth can be written as zero point one, and 42 and 6 tenths can be written as forty-two point six. \rightarrow We looked at our disks. We had 4 tens, 2 ones, and 6 disks that had 0.1 on them. \rightarrow We knew it was $42 + 0.6$, so that helped us rewrite $42 \frac{6}{10}$ as 42.6.

MP.4

Continue the process of showing a mixed number with place value disks, and then writing the expanded fraction form and expanded decimal form for the following numbers: 24 ones 6 tenths, 13 ones 8 tenths, and 68 ones 3 tenths. Challenge students to think how much each number needs to get to the next *one*.

Problem 3: Use the number line to model mixed numbers with units of ones and tenths.

T: (Distribute the Lesson 3 Template, tenths on a number line, and insert it into personal white boards.) Label the larger intervals from 0 to 5.

T: The segment between each whole number is divided up into how many equal parts?

S: 10 equal parts.

T: Plot a point on the number line to represent 4 and 1 tenth.

T: In the chart below your number line, let's plot the same number on a shorter number line partitioned into tenths. What will the endpoints of this shorter number line be?

S: 4 and 5.

T: (Fill out the chart to show 4.1 plotted on a number line between 4 and 5, in decimal form, as a mixed number, and in expanded form.)

Point	Number Line	Decimal Form	Mixed Number (ones and fraction form)	Expanded Form (fraction or decimal form)	How much more is needed to get to the next one?
a.		4.1	$4 \frac{1}{10}$	$(4 \times 1) + (1 \times \frac{1}{10}) = 4 \frac{1}{10}$ $(4 \times 1) + (1 \times 0.1) = 4.1$	$\frac{9}{10}$ or 0.9
b.		32.5	$32 \frac{5}{10}$	$(3 \times 10) + (2 \times 1) + (5 \times \frac{1}{10}) = 32 \frac{5}{10}$ $(3 \times 10) + (2 \times 1) + (5 \times 0.1) = 32.5$	$\frac{5}{10}$ or 0.5
c.		40.7	$40 \frac{7}{10}$	$(4 \times 10) + (7 \times \frac{1}{10}) = 40 \frac{7}{10}$ $(4 \times 10) + (7 \times 0.1) = 40.7$	$\frac{3}{10}$ or 0.3
d.		90.9	$90 \frac{9}{10}$	$(9 \times 10) + (9 \times \frac{1}{10}) = 90 \frac{9}{10}$ $(9 \times 10) + (9 \times 0.1) = 90.9$	$\frac{1}{10}$ or 0.1

tenths on a number line

S: (Write 4 ones and 1 tenth, 4.1, $4 \frac{1}{10}$, $(4 \times 1) + (1 \times 0.1) = 4.1$. $\rightarrow (4 \times 1) + (1 \times \frac{1}{10}) = 4 \frac{1}{10}$.)

T: How many more tenths are needed to get to 5? Explain to your partner how you know, and complete the final column of the chart.

S: 9 tenths. $\rightarrow \frac{9}{10}$. $\rightarrow 0.9$. \rightarrow I know because it takes 10 tenths to make a one. If we have 1 tenth, we need 9 more tenths to make 1.

Repeat the process by naming the following points for students to plot. Then, have them complete and share their charts. The longer number line with 5 whole number intervals can either be relabeled to show a broader range of numbers than those included in the chart or omitted for parts (b)–(d) below.

- b. 3 tens 2 ones and 5 tenths
- c. 4 tens 7 tenths
- d. 9 tens 9 tenths

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: Represent mixed numbers with units of tens, ones, and tenths with place value disks, on the number line, and in expanded form.

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.

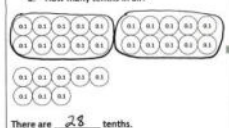

Any combination of the questions below may be used to lead the discussion.

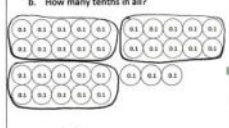

- Look at Problem 3(b). Today, we showed mixed numbers in **decimal expanded form** and **fraction expanded form**. How could you represent this number with place value disks? With an area model? Draw a line that is 17.5 cm in length.
- Look at Problem 3(a). How would you represent this number using only tenths? With your partner, use the number line or centimeter ruler to prove that 39 tenths is the same as 3 ones and 9 tenths.
- Look at Problems 2(d) and 3(c). How are these two problems alike?
- In Problems 2(c), 2(d), and 3(e) we have the same number of tens as tenths. Explain to your partner the difference in value between the tens place and the tenths place. Notice that the ones are sandwiched between the tens and tenths.

NYS COMMON CORE MATHEMATICS CURRICULUM Lesson 3 Problem Set 4•6

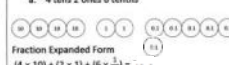
Name Jack Date _____


1. Circle groups of tenths to make as many ones as possible.

a. How many tenths in all?  Write and draw the same number using ones and tenths. 
 There are 28 tenths. Decimal Form: 2.8

b. How many tenths in all?  Write and draw the same number using ones and tenths. 
 There are 33 tenths. Decimal Form: 3.3


2. Draw disks to represent each number using tens, ones, and tenths. Then show the expanded form of the number in fraction form and decimal form as shown. The first one has been completed for you.


a. 4 tens 2 ones 6 tenths  Fraction Expanded Form $(4 \times 10) + (2 \times 1) + (6 \times \frac{1}{10}) = 42.6$
 Decimal Expanded Form $(4 \times 10) + (2 \times 1) + (6 \times 0.1) = 42.6$

b. 1 ten 7 ones 5 tenths  Fraction Expanded Form $(1 \times 10) + (7 \times 1) + (5 \times \frac{1}{10}) = 17.5$
 Decimal Expanded Form $(1 \times 10) + (7 \times 1) + (5 \times 0.1) = 17.5$

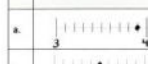

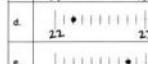


COMMON CORE Lesson 3: Represent mixed numbers with units of tens, ones, and tenths with number disks, on the number line, and in expanded form. engage ny 6.A.37
 Date: 1/28/14

NYS COMMON CORE MATHEMATICS CURRICULUM Lesson 3 Problem Set 4•6

c. 2 tens 3 ones 2 tenths  $(2 \times 10) + (3 \times 1) + (2 \times 0.1) = 23.2$
 $(2 \times 10) + (3 \times 1) + (2 \times \frac{1}{10}) = 23 \frac{2}{10}$

d. 7 tens 4 ones 7 tenths  $(7 \times 10) + (4 \times 1) + (7 \times 0.1) = 74.7$
 $(7 \times 10) + (4 \times 1) + (7 \times \frac{1}{10}) = 74 \frac{7}{10}$

3. Complete the chart.

	Number Line	Decimal Form	Mixed Number (ones and fraction form)	Expanded Form (fraction or decimal form)	How much to get to the next one?
a.		3.9	$3 \frac{9}{10}$	$(3 \times 1) + (9 \times \frac{1}{10})$	0.1
b.		17.5	$17 \frac{5}{10}$	$(1 \times 10) + (7 \times 1) + (5 \times 0.1)$	0.5
c.		74.7	$74 \frac{7}{10}$	$(7 \times 10) + (4 \times 1) + (7 \times \frac{1}{10})$	0.3
d.		22.2	$22 \frac{2}{10}$	$(2 \times 10) + (2 \times 1) + (2 \times 0.1)$	0.8
e.		80.8	$80 \frac{8}{10}$	$(8 \times 10) + (8 \times 0.1)$	0.2

COMMON CORE Lesson 3: Represent mixed numbers with units of tens, ones, and tenths with number disks, on the number line, and in expanded form. engage ny 6.A.38
 Date: 1/28/14

- How did you locate points on the number line?

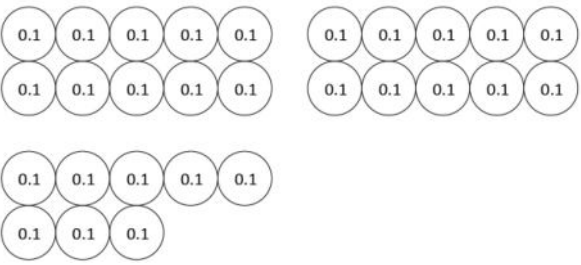
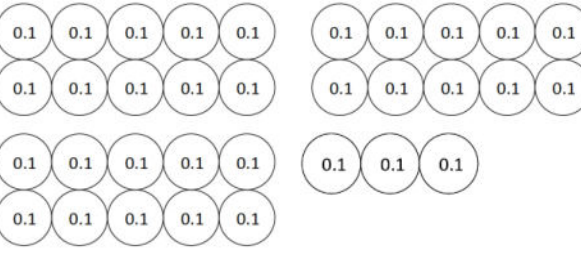
Exit Ticket (3 minutes)

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.

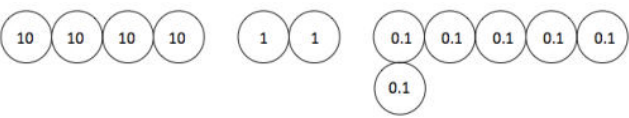
Name _____

Date _____

1. Circle groups of tenths to make as many ones as possible.

<p>a. How many tenths in all?</p>  <p>There are _____ tenths.</p>	<p>Write and draw the same number using ones and tenths.</p> <p>Decimal Form: _____</p> <p>How much more is needed to get to 3? _____</p>
<p>b. How many tenths in all?</p>  <p>There are _____ tenths.</p>	<p>Write and draw the same number using ones and tenths.</p> <p>Decimal Form: _____</p> <p>How much more is needed to get to 4? _____</p>

2. Draw disks to represent each number using tens, ones, and tenths. Then, show the expanded form of the number in fraction form and decimal form as shown. The first one has been completed for you.

<p>a. 4 tens 2 ones 6 tenths</p>  <p>Fraction Expanded Form $(4 \times 10) + (2 \times 1) + (6 \times \frac{1}{10}) = 42 \frac{6}{10}$</p> <p>Decimal Expanded Form $(4 \times 10) + (2 \times 1) + (6 \times 0.1) = 42.6$</p>	<p>b. 1 ten 7 ones 5 tenths</p>
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c. 2 tens 3 ones 2 tenths	d. 7 tens 4 ones 7 tenths
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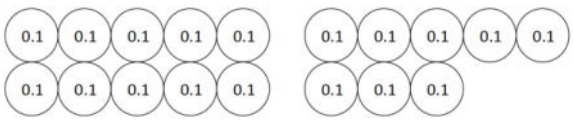
3. Complete the chart.

Point	Number Line	Decimal Form	Mixed Number (ones and fraction form)	Expanded Form (fraction or decimal form)	How much to get to the next one?
a.			$3\frac{9}{10}$		0.1
b.					
c.				$(7 \times 10) + (4 \times 1) + (7 \times \frac{1}{10})$	
d.			$22\frac{2}{10}$		
e.				$(8 \times 10) + (8 \times 0.1)$	



Name _____

Date _____

1. Circle groups of tenths to make as many ones as possible.

<p>How many tenths in all?</p>  <p>There are _____ tenths.</p>	<p>Write and draw the same number using ones and tenths.</p> <p>Decimal Form: _____</p> <p>How much more is needed to get to 2? _____</p>
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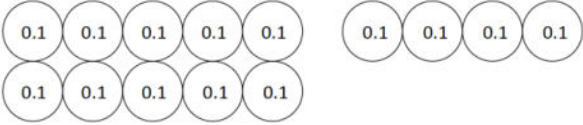
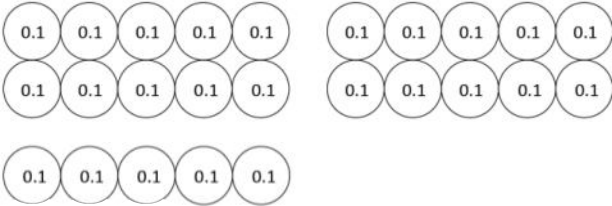
2. Complete the chart.

Point	Number Line	Decimal Form	Mixed Number (ones and fraction form)	Expanded Form (fraction or decimal form)	How much to get to the next one?
a.			$12 \frac{9}{10}$		
b.		70.7			

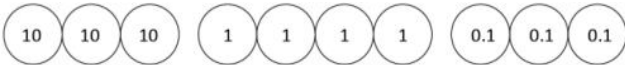
Name _____

Date _____

1. Circle groups of tenths to make as many ones as possible.


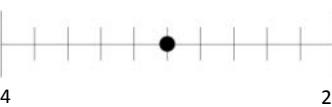



<p>a. How many tenths in all?</p>  <p>There are _____ tenths.</p>	<p>Write and draw the same number using ones and tenths.</p> <p>Decimal Form: _____</p> <p>How much more is needed to get to 2? _____</p>
<p>b. How many tenths in all?</p>  <p>There are _____ tenths.</p>	<p>Write and draw the same number using ones and tenths.</p> <p>Decimal Form: _____</p> <p>How much more is needed to get to 3? _____</p>

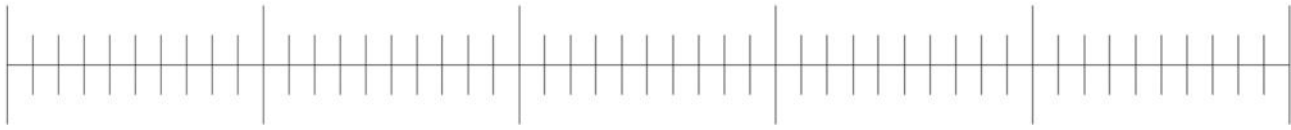
2. Draw disks to represent each number using tens, ones, and tenths. Then, show the expanded form of the number in fraction form and decimal form as shown. The first one has been completed for you.

<p>a. 3 tens 4 ones 3 tenths</p>  <p>Fraction Expanded Form $(3 \times 10) + (4 \times 1) + (3 \times \frac{1}{10}) = 34 \frac{3}{10}$</p> <p>Decimal Expanded Form $(3 \times 10) + (4 \times 1) + (3 \times 0.1) = 34.3$</p>	<p>b. 5 tens 3 ones 7 tenths</p>
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c. 3 tens 2 ones 3 tenths	d. 8 tens 4 ones 8 tenths
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3. Complete the chart.

Point	Number Line	Decimal Form	Mixed Number (ones and fraction form)	Expanded Form (fraction or decimal form)	How much to get to the next one?
a.			$4\frac{6}{10}$		
b.					0.5
c.				$(6 \times 10) + (3 \times 1) + (6 \times \frac{1}{10})$	
d.			$71\frac{3}{10}$		
e.				$(9 \times 10) + (9 \times 0.1)$	



Point	Number Line	Decimal Form	Mixed Number (ones and fraction form)	Expanded Form (fraction or decimal form)	How much more is needed to get to the next one?
a.					
b.					
c.					
d.					

_____ tenths on a number line