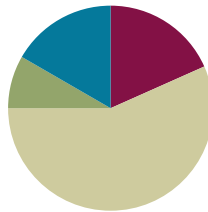


Lesson 7

Objective: Model mixed numbers with units of hundreds, tens, ones, tenths, and hundredths in expanded form and on the place value chart.

Suggested Lesson Structure

■ Fluency Practice	(11 minutes)
■ Application Problem	(5 minutes)
■ Concept Development	(34 minutes)
■ Student Debrief	(10 minutes)
Total Time	(60 minutes)



Fluency Practice (11 minutes)

- Count by Hundredths **4.NF.6** (5 minutes)
- Write the Decimal or Fraction **4.NF.5** (3 minutes)
- Write the Mixed Number **4.NF.5** (3 minutes)

Count by Hundredths (5 minutes)

Note: This fluency activity reviews Lessons 4–5.

T: Count by twos to 20, starting at zero.

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

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

S: $\frac{0}{100}, \frac{2}{100}, \frac{4}{100}, \frac{6}{100}, \frac{8}{100}, \frac{10}{100}, \frac{12}{100}, \frac{14}{100}, \frac{16}{100}, \frac{18}{100}, \frac{20}{100}$.

$\frac{0}{100}$	$\frac{2}{100}$	$\frac{4}{100}$	$\frac{6}{100}$	$\frac{8}{100}$	$\frac{10}{100}$	$\frac{12}{100}$	$\frac{14}{100}$	$\frac{16}{100}$	$\frac{18}{100}$	$\frac{20}{100}$
$\frac{0}{10}$					$\frac{1}{10}$					$\frac{2}{10}$

T: 1 tenth is the same as how many hundredths?

S: 10 hundredths.

T: (Beneath $\frac{10}{100}$, write $\frac{1}{10}$.)

Continue this process for $\frac{2}{10}$.

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

S: $\frac{0}{100}, \frac{2}{100}, \frac{4}{100}, \frac{6}{100}, \frac{8}{100}, \frac{1}{10}, \frac{12}{100}, \frac{14}{100}, \frac{16}{100}, \frac{18}{100}, \frac{2}{10}$.

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

S: $\frac{2}{10}, \frac{18}{100}, \frac{16}{100}, \frac{14}{100}, \frac{12}{100}, \frac{1}{10}, \frac{8}{100}, \frac{6}{100}, \frac{4}{100}, \frac{2}{100}, \frac{0}{100}$.

T: Count by 2 hundredths again. This time, when I raise my hand, stop.

S: $\frac{0}{100}, \frac{2}{100}, \frac{4}{100}, \frac{6}{100}$.

T: (Raise hand.) Say 6 hundredths using digits.

S: Zero point zero six.

T: Continue.

S: $\frac{8}{100}, \frac{1}{10}, \frac{12}{100}, \frac{14}{100}$.

T: (Raise hand.) Say 14 hundredths in digits.

S: Zero point one four.

T: Continue.

S: $\frac{16}{100}, \frac{18}{100}, \frac{2}{10}$.

T: (Raise hand.) Say 2 tenths in digits.

S: Zero point 2.

Write the Decimal or Fraction (3 minutes)

Materials: (T) Hundredths area model (Lesson 6 Fluency Template) (S) Personal white board

Note: This fluency activity reviews Lessons 4–5.

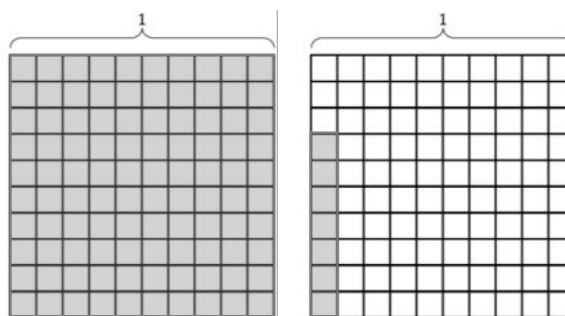
T: (Project hundredths area model. Shade 7 units.) This 1 square is divided into 100 equal parts. Write the fraction of the area that is shaded.

S: (Write $\frac{7}{100}$.)

T: (Write $\frac{7}{100} = \underline{\quad}.\underline{\quad}$.) Complete the number sentence.

S: (Write $\frac{7}{100} = 0.07$.)

T: (Project 2 hundredths area models as pictured to the right. Shade one in completely. Shade 7 units in the other area.) Write a fraction to express the area shaded.



S: (Write $1\frac{7}{100}$.)

T: (Write $1\frac{7}{100} = \underline{\quad}.\underline{\quad}$.) Complete the number sentence.

S: (Write $1\frac{7}{100} = 1.07$.)

Continue with the following possible sequence: $2\frac{7}{100}$, $\frac{5}{100}$, $1\frac{5}{100}$, $\frac{3}{100}$, and $2\frac{3}{100}$.

T: (Write $3\frac{16}{100} = 3 + \frac{\quad}{10} + \frac{\quad}{100} = 3.16$.) Complete the number sentence.

S: (Write $3\frac{16}{100} = 3 + \frac{1}{10} + \frac{6}{100} = 3.16$.)

Continue with the following possible sequence: $2\frac{15}{100}$ and $1\frac{47}{100}$.

Write the Mixed Number (3 minutes)

Materials: (S) Personal white board

Note: This fluency activity reviews Lesson 6.

T: (Write 1 one 7 hundredths.) Write 1 one 7 hundredths as a mixed number.

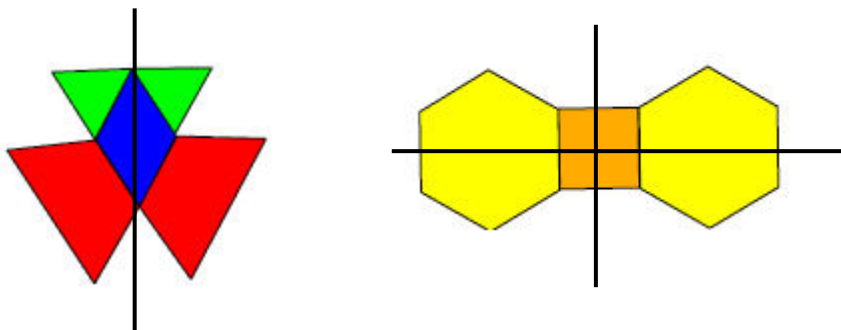
S: (Write $1\frac{7}{100}$.)

Continue with the following possible sequence: 1 one 17 hundredths, 3 ones 37 hundredths, 7 ones 64 hundredths, and 9 ones 90 hundredths.

Application Problem (5 minutes)

Materials: (S) Pattern blocks

Use pattern blocks to create at least 1 figure with at least 1 line of symmetry.



Note: This Application Problem reviews the concept of symmetry (Module 4) to prepare students to explore symmetry in the place value chart in today's Concept Development.

Concept Development (34 minutes)



**NOTES ON
MULTIPLE MEANS
OF REPRESENTATION:**

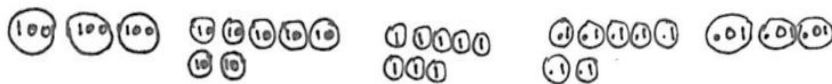
As learners begin to write numbers with decimal points, some students may need to be explicitly told to write a zero in the ones place as a placeholder, for example, in the number 0.7.

Materials: (T/S) Place value chart (Template), personal white board

Problem 1: Use place value disks to model mixed numbers with units of hundreds, tens, ones, tenths, and hundredths on the place value chart.

T: (Write 378.73.) Draw place value disks to show 378.73.

S: (Work.)



T: Write 378.73 in unit form.

S: (Write 3 hundreds 7 tens 8 ones 7 tenths 3 hundredths.)

3 hundreds 7 tens 8 ones 7 tenths 3 hundredths

T: (Project a place value chart showing hundreds to hundredths, including a decimal point as modeled below.) How is this place value chart different from the charts we have used this year?

S: It has a decimal point and places for tenths and hundredths.

T: Let's show 378.73 on the place value chart. (Distribute the place value chart template, and write 378.73 in the chart.) The digit 3 is written in which places? Tell me the largest place value first.

S: The hundreds and the hundredths.

Hundreds	Tens	Ones	.	Tenths	Hundredths
3	7	8		7	3

T: The digit 7 is written in which places? Tell me the largest place value first.

S: The tens and the tenths.

T: How about the 8?

S: The ones.

Repeat this process with 301.56 and 200.09.

Problem 2: Say the value of each digit.

T: (Show the place value chart with the number 378.73.) As with any place value chart, the value of each digit is determined by the place value unit.

T: Say the value of the digit in the hundreds place.

S: 3 hundreds.

T: Say the value of the digit in the hundredths place.

S: 3 hundredths.

T: These values sound so much alike. Discuss with your partner how to tell them apart.

S: One is hundreds, and one is hundredths. You have to be careful to say *th*. → One is a whole number, a hundred, and one is a fraction, a hundredth. → It’s easier to see how different the values are when you write them as numbers 100 and 0.01. → There are 100 hundredths in one and 100 ones in a hundred. 100×100 is 10,000. There are 10,000 hundredths in a hundred.

T: The digit 3 has a greater value in which place?

MP.8 S: The hundreds!

T: Say the value of the digit in the tens place.

S: 7 tens.

T: Say the value of the digit in the tenths place.

S: 7 tenths.

T: These values also sound so much alike. Discuss the difference with your partner.

S: One is tens, and one is tenths. → One is 10, and one is a tenth. → It’s easier to see when you write them as numbers: 10 and 0.1.

T: The digit 7 would have a greater value in which place?

S: The tens!

T: Say the value of the 8.

S: 8 ones.

Hundreds	Tens	Ones	.	Tenths	Hundredths
3	7	8		7	3

3 hundreds + 7 tens + 8 ones + 7 tenths + 3 hundredths

Repeat this process with 920.37.



**NOTES ON
MULTIPLE MEANS
OF ENGAGEMENT:**

Students working above grade level and others may enjoy an independent exploration of symmetry in the place value chart around 1. Ask students to search for patterns in our newly expanded place value chart. Students may find word patterns, such as *tenths* and *tens*, or patterns of ten—multiplying to increase values greater than 1 and dividing to decrease values greater than 1. Students can extend their expression of numbers in expanded form to include their observations of division. This work reaches beyond the scope of Grade 4 standards.

Problem 3: Express a decimal number in decimal and fraction expanded form.

$$(3 \times 100) + (7 \times 10) + (8 \times 1) + (7 \times \frac{1}{10}) + (3 \times \frac{1}{100}) = 378 \frac{73}{100}$$

$$(3 \times 100) + (7 \times 10) + (8 \times 1) + (7 \times 0.1) + (3 \times 0.01) = 378.73$$

- T: Work with a partner to write 378.73 in expanded form, representing the value of each digit as a multiplication expression.
- T: So, some of you expanded it in decimal form (point) and some in fraction form (point). How would you describe to someone what you just did?
- S: We took the number apart, one place value at a time. → We decomposed the number by its units. → There are 5 place values and 5 addends. Each addend is an expression that shows the product of the number of units and the size of the unit. → When it came to the tenths and hundredths, you didn't tell us if you wanted decimal form or fraction form, so we could write it either way.
- T: In order from largest to smallest, tell me the place value units for this number.
- S: Hundreds, tens, ones, tenths, and hundredths.
- T: Which digits represent the number of units, in order from left to right?
- S: 3, 7, 8, 7, and 3.
- T: What do we know about $378 \frac{73}{100}$ and 378.73?
- S: One is in fraction form, and the other is in decimal form. → They are made of the same 5 units. → They are the same amount. They are just expressed in different forms.

Repeat this process for 340.83 and 456.08. (Point out that when there is a digit of 0 within a number, the digit need not be expressed in expanded form since it adds no value to the number sentence; however, when expressing the number in standard form, the zero is included as a placeholder.)

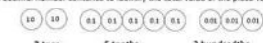
Problem Set (10 minutes)


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.

Lesson 7 Problem Set

Name Jack Date _____

1. Write a decimal number sentence to identify the total value of the place value disks.

a.  $20 + 0.5 + 0.03 = 20.53$

b.  $500 + 0.04 = 500.04$

2. Use the place value chart to answer the following questions. Express the value of the digit in unit form.

hundreds	tens	ones	tenths	hundredths
4	1	6	8	3

a. The digit 4 is in the hundreds place. It has a value of 4 hundreds.

b. The digit 1 is in the tens place. It has a value of 1 ten.

c. The digit 8 is in the tenths place. It has a value of 8 tenths.

d. The digit 3 is in the hundredths place. It has a value of 3 hundredths.

hundreds	tens	ones	tenths	hundredths
5	3	2	1	6

e. The digit 5 is in the hundreds place. It has a value of 5 hundreds.

f. The digit 3 is in the tens place. It has a value of 3 tens.

g. The digit 1 is in the tenths place. It has a value of 1 tenth.

h. The digit 6 is in the hundredths place. It has a value of 6 hundredths.

COMMON CORE Lesson 7: Use number disks to model decimal numbers to hundredths on the place value chart. Recognize the place value chart is symmetric around the decimal point. 6.B.8
Date: 3/24/14 engage^{ny}

Student Debrief (10 minutes)

Lesson Objective: Model mixed numbers with units of hundreds, tens, ones, tenths, and hundredths in expanded form and on the place value chart.

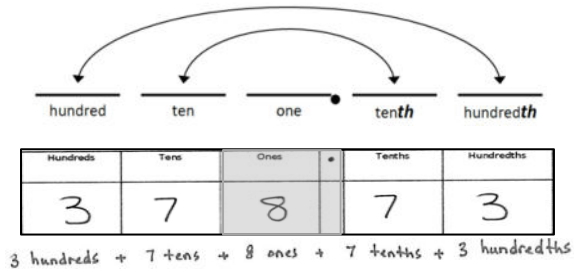
The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

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.

- How do the place value disks in Problem 1 help to show the value of each digit? How did the unit language help you to write the total value of the place value disks?
- In Problem 2 of the Problem Set, how did the place value chart help to determine the value of each digit?
- Look at the place value charts in Problem 2. *Ten* is found in the word *tenths*, and *hundred* is found in the word *hundredths*. We say that these place values are symmetric. What are they symmetric around? (Note: They are *not* symmetric about the decimal point.) I will shade the ones place to show the symmetry more dramatically.
- In Problem 3, we can write the expanded notation of a number in different ways. What is similar about each of the ways? What is different?
- How did the Application Problem connect to today's lesson?

Symmetry with respect to the ones place



NYS COMMON CORE MATHEMATICS CURRICULUM Lesson 7 Problem Set

3. Write each decimal as an equivalent fraction. Then, write each number in expanded form, using both decimal and fraction notation. The first one has been done for you.

Decimal and Fraction Form	Expanded Form	
	Fraction Notation	Decimal Notation
$15.43 = 15 \frac{43}{100}$	$(1 \times 10) + (5 \times 1) + (4 \times \frac{1}{10}) + (3 \times \frac{1}{100})$ $10 + 5 + \frac{4}{10} + \frac{3}{100}$	$(1 \times 10) + (5 \times 1) + (4 \times 0.1) + (3 \times 0.01)$ $10 + 5 + 0.4 + 0.03$
$21.4 = 21 \frac{4}{10}$	$(2 \times 10) + (1 \times 1) + (4 \times \frac{1}{10})$ $20 + 1 + \frac{4}{10}$	$(2 \times 10) + (1 \times 1) + (4 \times 0.1)$ $20 + 1 + 0.4$
$38.09 = 38 \frac{9}{100}$	$(3 \times 10) + (8 \times 1) + (9 \times \frac{1}{100})$ $30 + 8 + \frac{9}{100}$	$(3 \times 10) + (8 \times 1) + (9 \times 0.01)$ $30 + 8 + 0.09$
$50.2 = 50 \frac{2}{10}$	$(5 \times 10) + (2 \times \frac{1}{10})$ $50 + \frac{2}{10}$	$(5 \times 10) + (2 \times 0.1)$ $50 + 0.2$
$301.07 = 301 \frac{7}{100}$	$(3 \times 100) + (1 \times 1) + (7 \times \frac{1}{100})$ $300 + 1 + \frac{7}{100}$	$(3 \times 100) + (1 \times 1) + (7 \times 0.01)$ $300 + 1 + 0.07$
$620.80 = 620 \frac{8}{10}$	$(6 \times 100) + (2 \times 10) + (8 \times \frac{1}{10})$ $600 + 20 + \frac{8}{10}$	$(6 \times 100) + (2 \times 10) + (8 \times 0.1)$ $600 + 20 + 0.8$
$800.08 = 800 \frac{8}{100}$	$(8 \times 100) + (8 \times \frac{1}{100})$ $800 + \frac{8}{100}$	$(8 \times 100) + (8 \times 0.01)$ $800 + 0.08$

COMMON CORE Lesson 7: Use number disks to model decimal numbers to hundredths on the place value chart. Reproduce the place value chart is symmetric around one. 1/31/14 engage^{ny} 6.EE.9

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 aloud to the students.

Name _____ Date _____

1. Write a decimal number sentence to identify the total value of the place value disks.

a.

2 tens	5 tenths	3 hundredths	
_____	+	_____	+
		_____	=

b.

5 hundreds	4 hundredths	
_____	+	_____
		=

2. Use the place value chart to answer the following questions. Express the value of the digit in unit form.

hundreds	tens	ones	.	tenths	hundredths
4	1	6		8	3

- a. The digit _____ is in the hundreds place. It has a value of _____.
- b. The digit _____ is in the tens place. It has a value of _____.
- c. The digit _____ is in the tenths place. It has a value of _____.
- d. The digit _____ is in the hundredths place. It has a value of _____.

hundreds	tens	ones	.	tenths	hundredths
5	3	2		1	6

- e. The digit _____ is in the hundreds place. It has a value of _____.
- f. The digit _____ is in the tens place. It has a value of _____.
- g. The digit _____ is in the tenths place. It has a value of _____.
- h. The digit _____ is in the hundredths place. It has a value of _____.

3. Write each decimal as an equivalent fraction. Then, write each number in expanded form, using both decimal and fraction notation. The first one has been done for you.

Decimal and Fraction Form	Expanded Form	
	Fraction Notation	Decimal Notation
$15.43 = 15\frac{43}{100}$	$(1 \times 10) + (5 \times 1) + (4 \times \frac{1}{10}) + (3 \times \frac{1}{100})$ $10 + 5 + \frac{4}{10} + \frac{3}{100}$	$(1 \times 10) + (5 \times 1) + (4 \times 0.1) + (3 \times 0.01)$ $10 + 5 + 0.4 + 0.03$
$21.4 = \underline{\hspace{2cm}}$		
$38.09 = \underline{\hspace{2cm}}$		
$50.2 = \underline{\hspace{2cm}}$		
$301.07 = \underline{\hspace{2cm}}$		
$620.80 = \underline{\hspace{2cm}}$		
$800.08 = \underline{\hspace{2cm}}$		

Name _____

Date _____

1. Use the place value chart to answer the following questions. Express the value of the digit in unit form.

hundreds	tens	ones	.	tenths	hundredths
8	2	7		6	4

- a. The digit _____ is in the hundreds place. It has a value of _____.
- b. The digit _____ is in the tens place. It has a value of _____.
- c. The digit _____ is in the tenths place. It has a value of _____.
- d. The digit _____ is in the hundredths place. It has a value of _____.


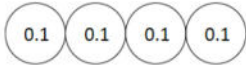

2. Complete the following chart.

Fraction	Expanded Form		Decimal
	Fraction Notation	Decimal Notation	
$422\frac{8}{100}$			
	$(3 \times 100) + (9 \times \frac{1}{10}) + (2 \times \frac{1}{100})$		


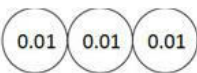
Name _____

Date _____

1. Write a decimal number sentence to identify the total value of the place value disks.

a.  3 tens  4 tenths  2 hundredths

_____ + _____ + _____ = _____

b.  4 hundreds  3 hundredths

_____ + _____ = _____

2. Use the place value chart to answer the following questions. Express the value of the digit in unit form.

hundreds	tens	ones	.	tenths	hundredths
8	2	7		6	4

- a. The digit _____ is in the hundreds place. It has a value of _____.
- b. The digit _____ is in the tens place. It has a value of _____.
- c. The digit _____ is in the tenths place. It has a value of _____.
- d. The digit _____ is in the hundredths place. It has a value of _____.

hundreds	tens	ones	.	tenths	hundredths
3	4	5		1	9

- e. The digit _____ is in the hundreds place. It has a value of _____.
- f. The digit _____ is in the tens place. It has a value of _____.
- g. The digit _____ is in the tenths place. It has a value of _____.
- h. The digit _____ is in the hundredths place. It has a value of _____.

3. Write each decimal as an equivalent fraction. Then, write each number in expanded form, using both decimal and fraction notation. The first one has been done for you.

Decimal and Fraction Form	Expanded Form	
	Fraction Notation	Decimal Notation
$14.23 = 14\frac{23}{100}$	$(1 \times 10) + (4 \times 1) + (2 \times \frac{1}{10}) + (3 \times \frac{1}{100})$ $10 + 4 + \frac{2}{10} + \frac{3}{100}$	$(1 \times 10) + (4 \times 1) + (2 \times 0.1) + (3 \times 0.01)$ $10 + 4 + 0.2 + 0.03$
$25.3 = \underline{\hspace{2cm}}$		
$39.07 = \underline{\hspace{2cm}}$		
$40.6 = \underline{\hspace{2cm}}$		
$208.90 = \underline{\hspace{2cm}}$		
$510.07 = \underline{\hspace{2cm}}$		
$900.09 = \underline{\hspace{2cm}}$		

hundreds	
tens	
.	
ones	
tens	
hundreds	

place value chart