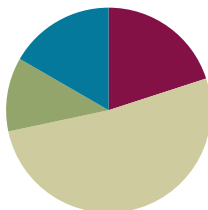


Lesson 8

Objective: Use understanding of fraction equivalence to investigate decimal numbers on the place value chart expressed in different units.

Suggested Lesson Structure

■ Fluency Practice	(12 minutes)
■ Application Problem	(7 minutes)
■ Concept Development	(31 minutes)
■ Student Debrief	(10 minutes)
Total Time	(60 minutes)



Fluency Practice (12 minutes)

- Sprint: Write Fractions and Decimals **4.NF.5** (9 minutes)
- Expanded Form **4.NF.5** (3 minutes)

Sprint: Write Fractions and Decimals (9 minutes)

Materials: (S) Write Fractions and Decimals Sprint

Note: This Sprint reviews Lessons 4–7.

Expanded Form (3 minutes)

Materials: (T/S) Personal white board

Note: This fluency activity reviews Lesson 7.

T: (Write $4\frac{17}{100}$.) Write 4 and 17 hundredths in expanded fraction form without multiplication.

S: (Write $4\frac{17}{100} = 4 + \frac{1}{10} + \frac{7}{100}$.)

T: Write 4 and 17 hundredths in expanded decimal form.

S: (Write $4.17 = 4 + 0.1 + 0.07$.)

Repeat the process for $25\frac{64}{100}$.

T: (Write 5.93.) Write 5 and 93 hundredths in expanded decimal form.

S: (Write $5.93 = 5 + 0.9 + 0.03$.)

T: Write 5 and 93 hundredths in expanded fraction form.

S: (Write $5\frac{93}{100} = 5 + \frac{9}{10} + \frac{3}{100}$.)

Application Problem (7 minutes)

Jashawn had 5 hundred dollar bills and 6 ten dollar bills in his wallet. Alva had 58 ten dollar bills under her mattress. James had 556 one dollar bills in his piggy bank. They decide to combine their money to buy a computer. Express the total amount of money they have using the following bills:

- a. Hundreds, tens, and ones
- b. Tens and ones
- c. Ones

Jashawn $500 + 60 = 560$
 Alva $58 \times 10 = 580$
 James $+ 556$

 $\$1,696$

- (a) 16 hundreds 9 tens 6 ones
- (b) 169 tens 6 ones
- (c) 1696 ones

Note: This Application Problem reviews expanded form and patterns of ten in the place value chart, as taught in Module 1. Reviewing patterns of ten and decomposition of familiar, larger place value units will prepare students for today’s exploration of decomposition and composition of smaller place value units.

Concept Development (31 minutes)

Materials: (T/S) Area model and place value chart (Template), personal white board

Problem 1: Represent numbers in unit form in terms of different units using the area model.

T: (Place area model and place value chart Template into personal white boards.) Show 2 ones 4 tenths shaded on the area model.

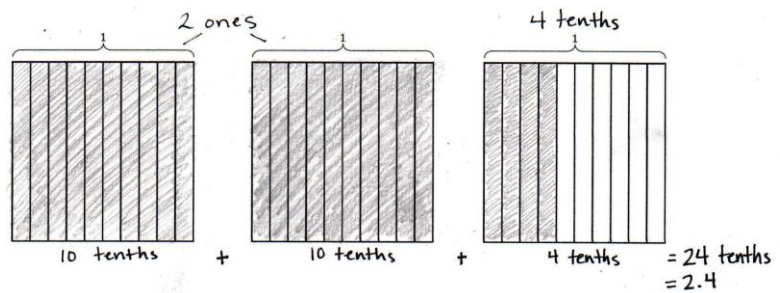
T: (Point to the first rectangle.) How many tenths are in 1?

S: 10 tenths.

T: Record 10 tenths below the first two rectangles. (Point to the third rectangle.) How many tenths are represented?

S: 4 tenths.

T: Record 4 tenths below this rectangle. (Write the addition symbol between the units.) What is 10 tenths plus 10 tenths plus 4 tenths?

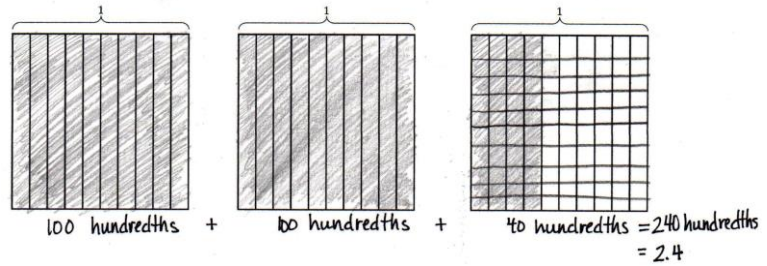


S: 24 tenths.
 T: (Write 2.4.) So, 2 and 4 tenths is equal to 24 tenths, true?

S: True.

T: Shade 2 ones 40 hundredths on the next set of area models.

T: Record an addition sentence in unit form that tells how many hundredths are shaded.



S: (Write 100 hundredths + 100 hundredths + 40 hundredths = 240 hundredths.)

T: What decimal number is 240 hundredths equal to?

S: 2.40. → 2.4.

T: How can it be equivalent to both?

S: 4 tenths is equal to 40 hundredths, so 0.4 equals 0.40.

Problem 2: Represent numbers in unit form in terms of different units using place value disks.

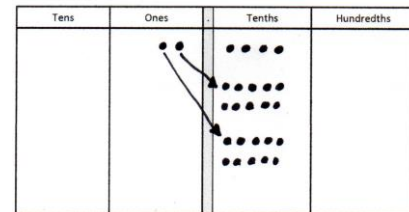
T: Represent 2 as tenths. How many tenths are in 2 ones?

S: $1 = \frac{10}{10}$, $2 = \frac{10}{10} + \frac{10}{10} = \frac{20}{10}$.

T: Say the equivalence.

S: 2 ones equals 20 tenths.

T: Show 2 ones 4 tenths on your place value chart using number disks. Express the number in unit form as it is shown on the chart.



2 ones 4 tenths
= 24 tenths

S: 2 ones 4 tenths.

T: Decompose the 2 ones and express them as tenths.

MP.6

S: 2 ones = $\frac{20}{10}$. There are 20 tenths + 4 tenths = 24 tenths.

T: How can I express 24 tenths as hundredths?

S: You can decompose the tenths to hundredths and count the total number of hundredths. That's too many place value disks to draw!

T: You're right! Let's solve without drawing place value disks. 1 tenth equals how many hundredths?

S: 1 tenth equals 10 hundredths.

T: 2 tenths is equivalent to how many hundredths?

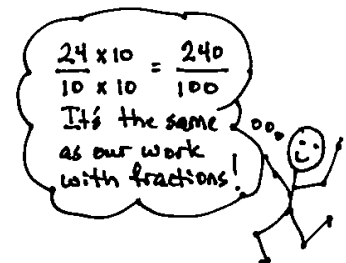
S: 2 tenths equals 20 hundredths.

T: So, 24 tenths equals...? Discuss it with your partner.

S: 240 hundredths. There are 10 times as many hundredths as there are tenths. We showed that using

$$2 \frac{4}{10} = \frac{24}{10} = 2.4$$

$$2 \frac{40}{100} = \frac{240}{100} = 2.40$$



MP.6

area models. → We can multiply the numerator and denominator by the same number, just like with fractions.

T: (Write $\frac{240}{100}$.) Write the equivalent decimal.

S: 2.40 or 2.4.

Repeat with 4.3.

Problem 3: Decompose mixed numbers to express as smaller units.

T: (Write 3.6.) Say this decimal.

S: 3 and 6 tenths.

T: How many tenths are in 3 ones?

S: 30 tenths.

T: How many tenths are in 3.6?

S: 36 tenths.

T: In fraction form and unit form, write how many tenths are equal to 3.6.

S: $3.6 = 36 \text{ tenths} = \frac{36}{10}$.

T: How many hundredths are in 3 ones?

S: 300 hundredths.

T: How many hundredths are in 6 tenths?

S: 60 hundredths.

T: How many hundredths are in 3.6?

S: 360 hundredths.

T: In fraction form and unit form, write how many hundredths are equal to 3.6.

S: $3.6 = 360 \text{ hundredths} = \frac{360}{100}$.

Repeat this process with 5.2 and 12.5.

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.



NOTES ON MULTIPLE MEANS OF ACTION AND EXPRESSION:

To scaffold the conversion of 24 tenths to 240 hundredths for students working below grade level, offer a few more steps. After verifying that 2 tenths equals 20 hundredths, ask, “5 tenths is equivalent to how many hundredths? (50.) 10 tenths is equivalent to how many hundredths? (100.) 20 tenths is equivalent to how many hundredths? (200.) So, 24 tenths equals...?”

NYS COMMON CORE MATHEMATICS CURRICULUM Lesson 8 Problem Set

Name: Jack Date: _____

1. Use the area model to represent $\frac{250}{100}$. Complete the number sentence.

a. $\frac{250}{100} = 25 \text{ tenths} = 2 \text{ ones } 5 \text{ tenths} = 2.5$

b. In the space below, explain how you determined your answer to (a).

I shaded in 25 tenths which was 25 bars. 20 bars equals 2 ones and the 5 bars left equals 5 tenths so I got 2.5.

2. Draw number disks to represent the following decompositions:

2 ones = 20 tenths 2 tenths = 20 hundredths

1 one 3 tenths = 13 tenths 2 tenths 3 hundredths = 23 hundredths

COMMON CORE Lesson 8: Use understanding of fraction equivalence to investigate decimal numbers on the place value chart expressed in different units. 6.8.8
Date: 1/24/15
engage^{ny}
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A

Number Correct: _____

Write Fractions and Decimals

1.	$\frac{3}{10} =$.
2.	$\frac{3}{100} =$.
3.	$\frac{23}{100} =$.
4.	$1\frac{23}{100} =$.
5.	$4\frac{23}{100} =$	.
6.	$0.07 =$	—
7.	$1.07 =$	—
8.	$0.7 =$	—
9.	$1.7 =$	—
10.	$1.74 =$	—
11.	$\frac{4}{100} =$	.
12.	$0.6 =$	—
13.	$\frac{7}{100} =$	.
14.	$0.02 =$	—
15.	$\frac{9}{100} =$	.
16.	$\frac{10}{100} =$	.
17.	$\frac{10}{100} + \frac{2}{100} =$	.
18.	$\frac{1}{10} + \frac{2}{100} =$	.
19.	$\frac{1}{10} + \frac{3}{100} =$	.
20.	$\frac{1}{10} + \frac{4}{100} =$	.
21.	$\frac{1}{10} + \frac{9}{100} =$	.
22.	$3 + \frac{1}{10} + \frac{9}{100} =$	.

23.	$2 + \frac{1}{10} + \frac{6}{100} =$	.
24.	$2 + 0.1 + 0.06 =$	.
25.	$3 + 0.1 + 0.06 =$	.
26.	$3 + 0.1 + 0.04 =$	.
27.	$3 + 0.5 + 0.04 =$	.
28.	$2 + 0.3 + 0.08 =$	.
29.	$2 + 0.08 =$	.
30.	$1 + 0.3 =$	.
31.	$10 + 0.3 =$	.
32.	$1 + 0.4 + 0.06 =$	.
33.	$10 + 0.4 + 0.06 =$	.
34.	$30 + 0.7 + 0.02 =$	.
35.	$2 + \frac{3}{10} + 0.05 =$	.
36.	$4 + 0.5 + \frac{3}{100} =$	.
37.	$4 + \frac{3}{100} + 0.5 =$	.
38.	$0.5 + \frac{3}{100} + 4 =$	.
39.	$20 + 0.8 + 0.01 =$	.
40.	$4 + \frac{9}{100} + \frac{2}{10} =$	.
41.	$0.04 + 2 + 0.7 =$	—
42.	$\frac{6}{10} + 8 + \frac{2}{100} =$	.
43.	$\frac{5}{100} + 8 + 0.9 =$	—
44.	$0.9 + 10 + \frac{4}{100} =$	.

B

Number Correct: _____

Improvement: _____

Write Fractions and Decimals

1.	$\frac{1}{10} =$	.
2.	$\frac{2}{10} =$	.
3.	$\frac{3}{10} =$	.
4.	$\frac{7}{10} =$	.
5.	$\frac{5}{10} =$	.
6.	$0.2 =$	—
7.	$0.3 =$	—
8.	$0.4 =$	—
9.	$0.8 =$	—
10.	$0.6 =$	—
11.	$\frac{4}{10} =$	.
12.	$0.9 =$	—
13.	$\frac{6}{10} =$	.
14.	$0.5 =$	—
15.	$\frac{9}{10} =$	.
16.	$\frac{10}{10} =$	.
17.	$\frac{11}{10} =$	.
18.	$\frac{12}{10} =$	.
19.	$\frac{17}{10} =$	.
20.	$\frac{27}{10} =$	.
21.	$\frac{47}{10} =$	.
22.	$\frac{34}{10} =$	.

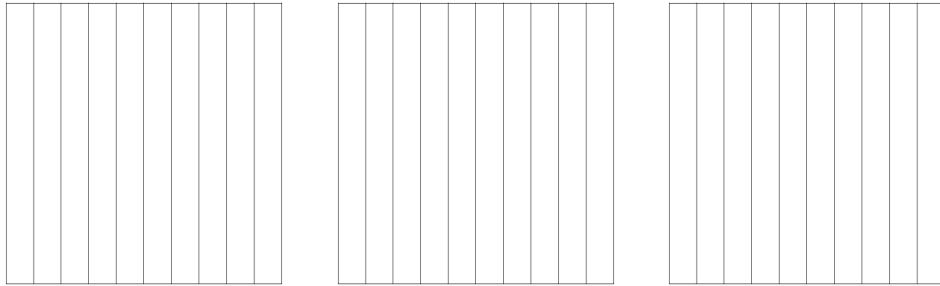
23.	$2 + \frac{1}{10} + \frac{4}{100} =$	.
24.	$2 + 0.1 + 0.04 =$	.
25.	$3 + 0.1 + 0.04 =$	.
26.	$3 + 0.1 + 0.06 =$	.
27.	$3 + 0.5 + 0.06 =$	.
28.	$2 + 0.4 + 0.09 =$	.
29.	$2 + 0.06 =$	.
30.	$1 + 0.5 =$	.
31.	$10 + 0.5 =$	.
32.	$1 + 0.2 + 0.04 =$	.
33.	$10 + 0.2 + 0.04 =$	.
34.	$30 + 0.9 + 0.06 =$	.
35.	$2 + \frac{5}{10} + 0.07 =$	.
36.	$4 + 0.7 + \frac{5}{100} =$	.
37.	$4 + \frac{5}{100} + 0.7 =$	.
38.	$0.7 + \frac{5}{100} + 4 =$	.
39.	$20 + 0.6 + 0.01 =$	.
40.	$6 + \frac{7}{100} + \frac{4}{10} =$	.
41.	$0.06 + 2 + 0.9 =$	—
42.	$\frac{8}{10} + 6 + \frac{4}{100} =$	.
43.	$\frac{3}{100} + 8 + 0.7 =$	—
44.	$0.7 + 10 + \frac{6}{100} =$	.

Name _____

Date _____

1. Use the area model to represent $\frac{250}{100}$. Complete the number sentence.

a. $\frac{250}{100} =$ _____ tenths = _____ ones _____ tenths = __.____



b. In the space below, explain how you determined your answer to (a).

2. Draw number disks to represent the following decompositions:

2 ones = _____ tenths

ones	.	tenths	hundredths

2 tenths = _____ hundredths

ones	.	tenths	hundredths

1 one 3 tenths = _____ tenths

ones	.	tenths	hundredths

2 tenths 3 hundredths = _____ hundredths

ones	.	tenths	hundredths

3. Decompose the units to represent each number as tenths.

a. $1 = \underline{\hspace{1cm}}$ tenths

b. $2 = \underline{\hspace{1cm}}$ tenths

c. $1.7 = \underline{\hspace{1cm}}$ tenths

d. $2.9 = \underline{\hspace{1cm}}$ tenths

e. $10.7 = \underline{\hspace{1cm}}$ tenths

f. $20.9 = \underline{\hspace{1cm}}$ tenths

4. Decompose the units to represent each number as hundredths.

a. $1 = \underline{\hspace{1cm}}$ hundredths

b. $2 = \underline{\hspace{1cm}}$ hundredths

c. $1.7 = \underline{\hspace{1cm}}$ hundredths

d. $2.9 = \underline{\hspace{1cm}}$ hundredths

e. $10.7 = \underline{\hspace{1cm}}$ hundredths

f. $20.9 = \underline{\hspace{1cm}}$ hundredths

5. Complete the chart. The first one has been done for you.

Decimal	Mixed Number	Tenths	Hundredths
2.1	$2\frac{1}{10}$	21 tenths $\frac{21}{10}$	210 hundredths $\frac{210}{100}$
4.2			
8.4			
10.2			
75.5			

Name _____

Date _____

1. a. Draw number disks to represent the following decomposition:

3 ones 2 tenths = _____ tenths

ones	.	tenths	hundredths

b. 3 ones 2 tenths = _____ hundredths

2. Decompose the units.

a. 2.6 = _____ tenths

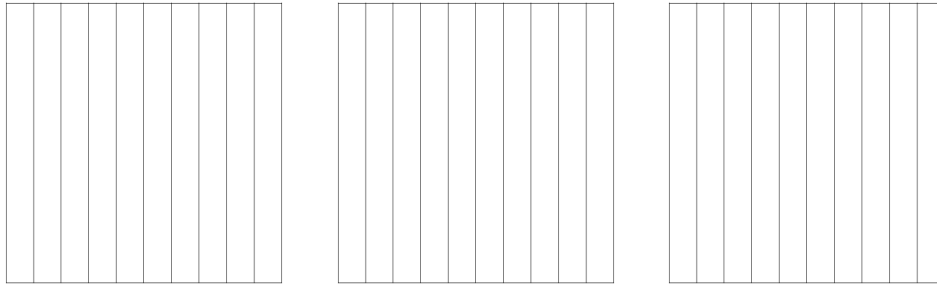
b. 6.1 = _____ hundredths

Name _____

Date _____

1. Use the area model to represent $\frac{220}{100}$. Complete the number sentence.

a. $\frac{220}{100} =$ _____ tenths = _____ ones _____ tenths = ____.



b. In the space below, explain how you determined your answer to (a).

2. Draw number disks to represent the following decompositions:

3 ones = _____ tenths

ones	.	tenths	hundredths

3 tenths = _____ hundredths

ones	.	tenths	hundredths

2 ones 3 tenths = ____ tenths

ones	.	tenths	hundredths

3 tenths 3 hundredths = ____ hundredths

ones	.	tenths	hundredths

3. Decompose the units to represent each number as tenths.

a. $1 = \underline{\hspace{1cm}}$ tenths

b. $2 = \underline{\hspace{1cm}}$ tenths

c. $1.3 = \underline{\hspace{1cm}}$ tenths

d. $2.6 = \underline{\hspace{1cm}}$ tenths

e. $10.3 = \underline{\hspace{1cm}}$ tenths

f. $20.6 = \underline{\hspace{1cm}}$ tenths

4. Decompose the units to represent each number as hundredths.

a. $1 = \underline{\hspace{1cm}}$ hundredths

b. $2 = \underline{\hspace{1cm}}$ hundredths

c. $1.3 = \underline{\hspace{1cm}}$ hundredths

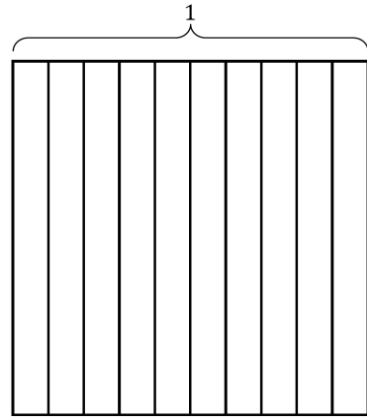
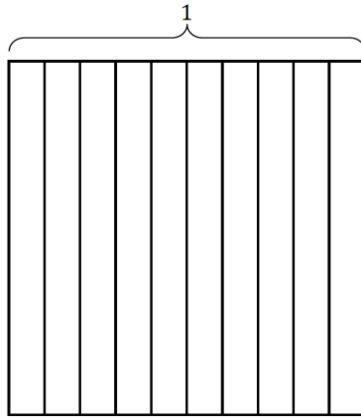
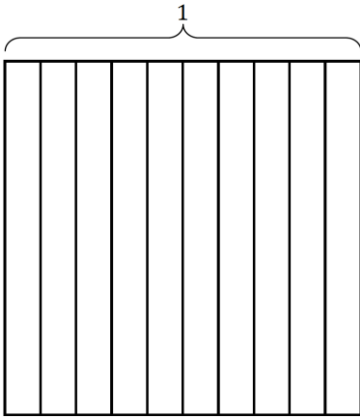
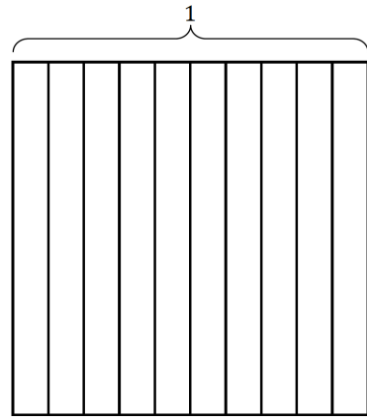
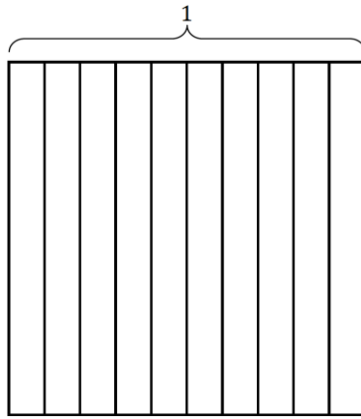
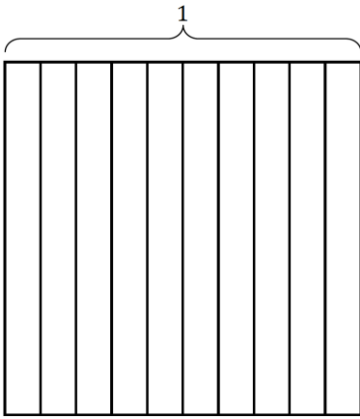
d. $2.6 = \underline{\hspace{1cm}}$ hundredths

e. $10.3 = \underline{\hspace{1cm}}$ hundredths

f. $20.6 = \underline{\hspace{1cm}}$ hundredths

5. Complete the chart. The first one has been done for you.

Decimal	Mixed Number	Tenths	Hundredths
4.1	$4 \frac{1}{10}$	41 tenths $\frac{41}{10}$	410 hundredths $\frac{410}{100}$
5.3			
9.7			
10.9			
68.5			



Tens	Ones	.	Tenths	Hundredths

area model and place value chart