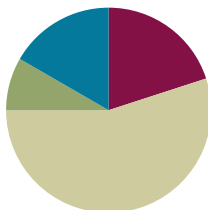


Lesson 12

Objective: Apply understanding of fraction equivalence to add tenths and 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)

- Add and Subtract **4.NBT.4** (3 minutes)
- Compare Decimal Numbers **4.NF.7** (4 minutes)
- Order Decimal Numbers **4.NF.7** (5 minutes)

Add and Subtract (3 minutes)

Materials: (S) Personal white board

Note: This fluency activity reviews adding and subtracting using the standard algorithm.

- T: (Write 473 thousands 379 ones + 473 thousands 379 ones.) On your personal white board, write this addition sentence in standard form.
- S: (Write $473,379 + 473,379$.)
- T: Add using the standard algorithm.
- S: (Write $473,379 + 473,379 = 946,758$ using the standard algorithm.)

Continue the process for $384,917 + 384,917$.

- T: (Write 700 thousand 1 ten.) On your board, write this number in standard form.
- S: (Write 700,010.)



NOTES ON MULTIPLE MEANS OF EXPRESSION:

Challenge students working above grade level and others to apply efficient alternative strategies learned since Grade 1 to solve the Add and Subtract fluency activity. For example, students can avoid renaming to solve $700,010 - 199,856$ by subtracting 11 from both the minuend and the subtrahend (i.e., $699,999 - 199,845$) or by adding 144 to both the minuend and subtrahend (i.e., $700,154 - 200,000$). Prompt students to explore and explain why the difference is the same using all three methods.

T: (Write 199 thousands 856 ones.) Subtract this number from 700,010 using the standard algorithm.

S: (Write $700,010 - 199,856 = 500,154$ using the standard algorithm.)

Continue the process for $900,080 - 288,099$.

Compare Decimal Numbers (4 minutes)

Materials: (S) Personal white board

Note: This fluency activity reviews Lesson 10.

T: (Write $3.20 \underline{\quad} 3.2$.) Complete the number sentence, filling in a greater than, less than, or equal sign.

S: (Write $3.20 = 3.2$.)

Continue with the following possible sequence: $7.8 \underline{\quad} 7.85$, $5.72 \underline{\quad} 5.27$, $2.9 \underline{\quad} 2.89$, $6.24 \underline{\quad} 6.42$, $10.8 \underline{\quad} 10.08$, and $14.39 \underline{\quad} 14.9$.

Order Decimal Numbers (5 minutes)

Materials: (S) Personal white board

Note: This fluency activity reviews Lesson 11.

T: (Write 0.3 , $\frac{1}{10}$, and 0.44 .) Arrange the numbers in order from least to greatest.

S: (Write $\frac{1}{10}$, 0.3 , and 0.44 .)

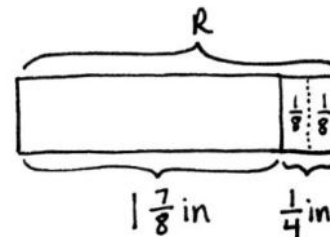
Continue with the following possible sequence:

- $\frac{13}{10}$, $\frac{43}{100}$, $\frac{1}{100}$, 0.54 , 0.1 , 0.55 , 0.66
- $\frac{93}{10}$, 3 ones and 9 hundredths, $\frac{39}{100}$, 30 and 9 tenths, $\frac{390}{100}$, 3.93

Application Problem (5 minutes)

On Monday, $1\frac{7}{8}$ inches of rain fell. On Tuesday, it rained $\frac{1}{4}$ inch. What was the total rainfall for the two days?

Note: This Application Problem builds from Module 5 work where students learned to add fractions with related units (wherein one denominator is a factor of the other) and mixed numbers. Review of this lesson leads to today's Concept Development where students convert tenths to hundredths before adding decimal numbers.



$$R = 1\frac{7}{8} \text{ in} + \frac{1}{4} \text{ in}$$

$$\begin{array}{c} \diagup \quad \diagdown \\ \frac{1}{8} \quad \frac{1}{8} \end{array}$$

$$\frac{1}{4} = \frac{1 \times 2}{4 \times 2} = \frac{2}{8}$$

$$R = 2 \text{ in} + \frac{1}{8} \text{ in}$$

$$R = 2\frac{1}{8} \text{ in}$$

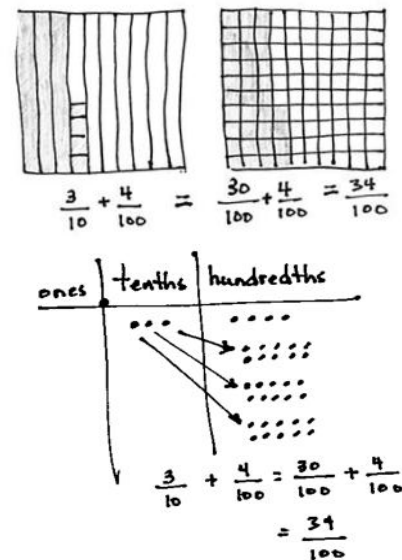
The total rainfall for the 2 days was $2\frac{1}{8}$ inches.

Concept Development (33 minutes)

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

Problem 1: Add tenths and hundredths written in unit form using pictorial models.

- T: What is 3 girls + 2 girls?
 S: 5 girls.
 T: What is 3 girls + 2 students?
 S: We can't add girls and students. The units don't match.
 T: True. But, let's say the girls are students. Tell me the new number sentence, renaming to make like units.
 S: 3 students + 2 students = 5 students.
 T: What is 3 fourths + 2 fourths?
 S: 5 fourths.
 T: What is 3 fourths + 1 half? How can you solve? Discuss with your partner.
 S: We have to make like units. → We have to rename a half as fourths. → We can convert halves to fourths: $\frac{1}{2} = \frac{2}{4}$. Then, we can add, $\frac{3}{4} + \frac{2}{4} = \frac{5}{4}$.
 T: Is this true? (Write $\frac{3}{4} + \frac{1}{2} = \frac{3}{4} + \frac{2}{4}$.)
 S: Yes!
 T: 3 tenths + 4 tenths is...?
 S: 7 tenths.
 T: 3 tenths + 4 hundredths is...? How can you solve? Discuss with a partner.
 S: We have to make like units. → We have to rename 3 tenths as 30 hundredths. → We can decompose tenths into hundredths. → We can convert tenths to hundredths: $\frac{3}{10} = \frac{30}{100}$. Then, we can add, $\frac{30}{100} + \frac{4}{100} = \frac{34}{100}$.
 T: Is this true? (Write 3 tenths + 4 hundredths = 30 hundredths + 4 hundredths.)
 S: Yes!
 T: Model the addition using an area model or place value chart. Show the conversion of tenths to hundredths. Discuss with your partner.
 S: I drew the area model showing 3 tenths and 4 hundredths. Then, I decomposed the area into hundredths to make like units. That meant that I had 30 hundredths and 4 hundredths to have a total of 34 hundredths. → On the place value chart, I drew 3 tenths and 4 hundredths and then decomposed each tenth into 10 hundredths. That gave me a total of 34 hundredths.



Repeat the process for 2 tenths + 17 hundredths and 36 hundredths + 6 tenths.

Problem 2: Add tenths and hundredths by converting using multiplication. Express the sum as a decimal.

T: (Write $\frac{3}{10} + \frac{13}{100}$.) Are we ready to add?

S: No.

T: Discuss with a partner. How can we solve using multiplication to make like units?

S: Multiply both the numerator and denominator of 3 tenths by 10 so that we have like units—hundredths.

→ Convert 3 tenths to hundredths. $\frac{3}{10} = \frac{3 \times 10}{10 \times 10} = \frac{30}{100}$.

$$\frac{30}{100} + \frac{13}{100} = \frac{43}{100}$$

T: Write $\frac{43}{100}$ as a decimal.

S: 0.43.

T: Is this true? (Write $\frac{3}{10} + \frac{13}{100} = \frac{30}{100} + \frac{13}{100} = \frac{43}{100} = 0.43$.)

S: Yes.

Repeat the process with $\frac{2}{10} + \frac{36}{100}$ and $\frac{40}{100} + \frac{6}{100}$.



**NOTES ON
MULTIPLE MEANS
OF REPRESENTATION:**

After the initial use of multiplication to convert tenths to hundredths, many students may be able to do the conversion mentally. Encourage this shortcut because it is empowering. This is an important application of students' work with equivalence from Module 5, which leads to addition and subtraction of fractions with unlike denominators in Grade 5.

If some students still struggle with the conversion, directly link the multiplication to the area model and place value chart.

Problem 3: Add tenths and hundredths with sums greater than 1. Express the sum as a decimal.

T: (Write $\frac{6}{10} + \frac{57}{100}$.) Read the expression.

S: 6 tenths + 57 hundredths.

T: Solve, and then explain your solution to your partner. (Two solution strategies are pictured below.)

$$\frac{6}{10} + \frac{57}{100} = \frac{60}{100} + \frac{57}{100} = 1 \frac{17}{100} = 1.17$$

$$\frac{6}{10} + \frac{57}{100} = \frac{60}{100} + \frac{57}{100} = \frac{117}{100} = 1 \frac{17}{100} = 1.17$$

MP.6

S: I changed 6 tenths to 60 hundredths and then made 1 by adding 50 hundredths, which I took out of each addend. That meant 10 hundredths and 7 hundredths were left to be added. The sum is $1 \frac{17}{100}$.
 → I just added 60 hundredths and 57 hundredths to get 117 hundredths and then decomposed to get 100 hundredths and 17 hundredths. → I converted 6 tenths to 60 hundredths and then took out 40 hundredths from 57 hundredths to make 1 and added on the leftover 17 hundredths.

T: Write your answer as a decimal.

S: 1.17.

- T: (Write $\frac{9}{10} + \frac{64}{100}$.)
- T: Solve, and then share your solution strategy with a partner.
- S: I used a number bond to decompose 64 hundredths into 10 hundredths and 54 hundredths to make 1.
 → I added to get 154 hundredths and decomposed the sum into 100 hundredths and 54 hundredths, or 1 and 54 hundredths.
- T: Write your answer as a decimal.
- S: 1.54.

$$\frac{9}{10} + \frac{64}{100} = \frac{90}{100} + \frac{64}{100} = 1 \frac{54}{100} = 1.54$$

$$\frac{9}{10} + \frac{64}{100} = \frac{90}{100} + \frac{64}{100} = \frac{154}{100} = 1 \frac{54}{100} = 1.54$$

Repeat the process with $\frac{2}{10} + \frac{91}{100}$ and $\frac{45}{100} + \frac{8}{10}$.

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: Apply understanding of fraction equivalence to add tenths and 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.

Problem Set Lesson 12 4•6

Name: Jack Date: _____

1. Complete the number sentence by expressing each part using hundredths. Model using the place value chart, as shown in Part (a).

ones	tenths	hundredths	
●	●	●●●●	a. 1 tenth + 5 hundredths = <u>15</u> hundredths
●	●●	●●●●	b. 2 tenths + 1 hundredth = <u>21</u> hundredths
●	●	●●●●●	c. 1 tenth + 12 hundredths = <u>22</u> hundredths

2. Solve by converting all addends to hundredths before solving.

a. 1 tenth + 3 hundredths = 10 hundredths + 3 hundredths = 13 hundredths

b. 5 tenths + 12 hundredths = 50 hundredths + 12 hundredths = 62 hundredths

c. 7 tenths + 27 hundredths = 70 hundredths + 27 hundredths = 97 hundredths

d. 37 hundredths + 7 tenths = 37 hundredths + 70 hundredths = 107 hundredths

COMMON CORE Lesson 12: Apply understanding of fraction equivalence to add tenths and hundredths. engage^{ny} 6.0.7
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Any combination of the questions below may be used to lead the discussion.

- How did the work in Problem 1 help to prepare you to solve Problem 2?
- In Problem 3(d), what do you notice about your answer? Can the answer be written using a unit other than hundredths? Does that apply to any solutions in Problem 4?
- In Problem 5, if the water and iodine are mixed together, can we just measure the amount of iodine in the large beaker? Explain.
- What have we learned before that made converting to like units so easy? What have we learned before that made adding tenths and hundredths so easy?
- How did the Application Problem connect to today's lesson?

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.

Problem Set Lesson 12 4•6

3. Find the sum. Convert tenths to hundredths as needed. Write your answer as a decimal.

a. $\frac{2}{10} + \frac{8}{100} = \frac{20}{100} + \frac{8}{100} = \frac{28}{100} = 0.28$

b. $\frac{13}{100} + \frac{40}{100} = \frac{53}{100} = 0.53$

c. $\frac{6}{10} + \frac{39}{100} = \frac{60}{100} + \frac{39}{100} = \frac{99}{100} = 0.99$

d. $\frac{70}{100} + \frac{30}{100} = \frac{100}{100} = 1$

4. Solve. Write your answer as a decimal.

a. $\frac{90}{100} + \frac{42}{100} = \frac{132}{100} = 1.32$

b. $\frac{70}{100} + \frac{50}{100} = \frac{120}{100} = 1 \frac{20}{100} = 1.2$

c. $\frac{68}{100} + \frac{8}{10} = \frac{68}{100} + \frac{80}{100} = \frac{148}{100} = 1.48$

d. $\frac{70}{100} + \frac{87}{100} = \frac{157}{100} = 1.57$

5. Beaker A has $\frac{63}{100}$ liter of iodine. It is filled the rest of the way with water up to 1 liter. Beaker B has $\frac{4}{10}$ liter of iodine. It is filled the rest of the way with water up to 1 liter. If both beakers are emptied into a large beaker, how much iodine will be in the large beaker?

$\frac{63}{100} + \frac{4}{10} = \frac{63}{100} + \frac{40}{100} = \frac{103}{100} = 1 \frac{3}{100} = 1.03$

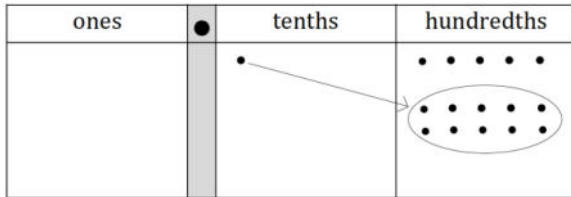
The larger beaker will have 1.03 liters of iodine.

COMMON CORE Lesson 12: Apply understanding of fraction equivalence to add tenths and hundredths. Date: 1/18/15 engage^{ny} 6.OA.B

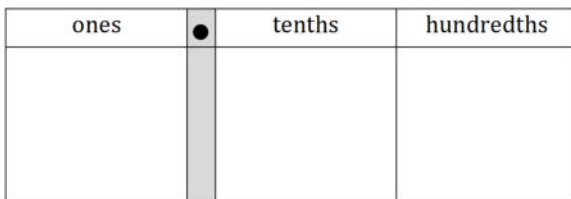
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Date _____

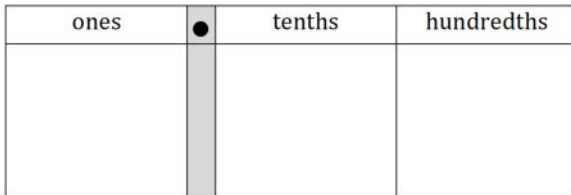
1. Complete the number sentence by expressing each part using hundredths. Model using the place value chart, as shown in part (a).



a. 1 tenth + 5 hundredths = _____ hundredths



b. 2 tenths + 1 hundredth = _____ hundredths



c. 1 tenth + 12 hundredths = _____ hundredths

2. Solve by converting all addends to hundredths before solving.

a. 1 tenth + 3 hundredths = _____ hundredths + 3 hundredths = _____ hundredths

b. 5 tenths + 12 hundredths = _____ hundredths + _____ hundredths = _____ hundredths

c. 7 tenths + 27 hundredths = _____ hundredths + _____ hundredths = _____ hundredths

d. 37 hundredths + 7 tenths = _____ hundredths + _____ hundredths = _____ hundredths

3. Find the sum. Convert tenths to hundredths as needed. Write your answer as a decimal.

a. $\frac{2}{10} + \frac{8}{100}$

b. $\frac{13}{100} + \frac{4}{10}$

c. $\frac{6}{10} + \frac{39}{100}$

d. $\frac{70}{100} + \frac{3}{10}$

4. Solve. Write your answer as a decimal.

a. $\frac{9}{10} + \frac{42}{100}$

b. $\frac{70}{100} + \frac{5}{10}$

c. $\frac{68}{100} + \frac{8}{10}$

d. $\frac{7}{10} + \frac{87}{100}$

5. Beaker A has $\frac{63}{100}$ liter of iodine. It is filled the rest of the way with water up to 1 liter. Beaker B has $\frac{4}{10}$ liter of iodine. It is filled the rest of the way with water up to 1 liter. If both beakers are emptied into a large beaker, how much iodine does the large beaker contain?

Name _____

Date _____

1. Complete the number sentence by expressing each part using hundredths. Use the place value chart to model.

ones	●	tenths	hundredths

$$1 \text{ tenth} + 9 \text{ hundredths} = \underline{\quad\quad} \text{ hundredths}$$

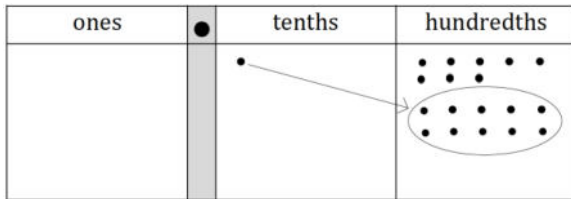
2. Find the sum. Write your answer as a decimal.

$$\frac{4}{10} + \frac{73}{100}$$

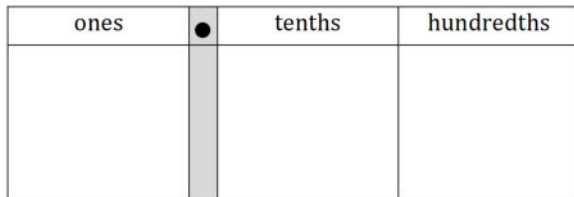
Name _____

Date _____

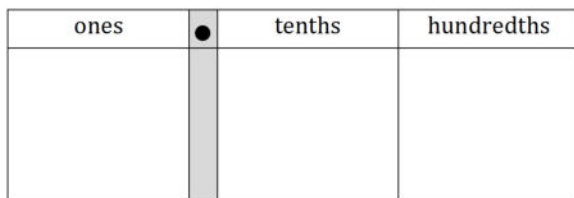
1. Complete the number sentence by expressing each part using hundredths. Model using the place value chart, as shown in part (a).



a. 1 tenth + 8 hundredths = _____ hundredths



b. 2 tenths + 3 hundredths = _____ hundredths



c. 1 tenth + 14 hundredths = _____ hundredths

2. Solve by converting all addends to hundredths before solving.

a. 1 tenth + 2 hundredths = _____ hundredths + 2 hundredths = _____ hundredths

b. 4 tenths + 11 hundredths = _____ hundredths + _____ hundredths = _____ hundredths

c. 8 tenths + 25 hundredths = _____ hundredths + _____ hundredths = _____ hundredths

d. 43 hundredths + 6 tenths = _____ hundredths + _____ hundredths = _____ hundredths

3. Find the sum. Convert tenths to hundredths as needed. Write your answer as a decimal.

a. $\frac{3}{10} + \frac{7}{100}$

b. $\frac{16}{100} + \frac{5}{10}$

c. $\frac{5}{10} + \frac{40}{100}$

d. $\frac{20}{100} + \frac{8}{10}$

4. Solve. Write your answer as a decimal.

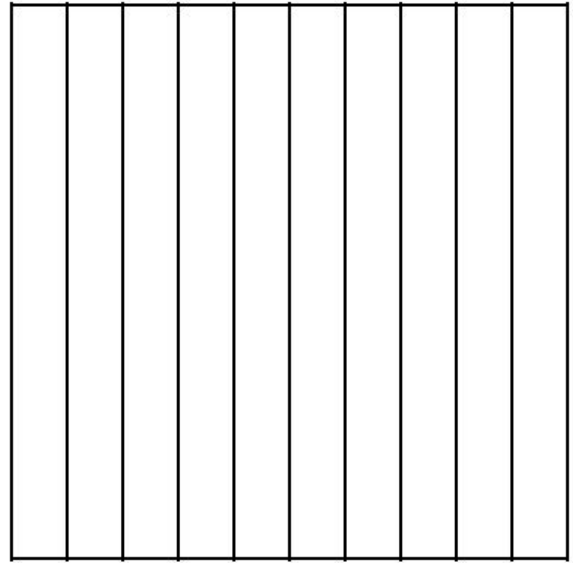
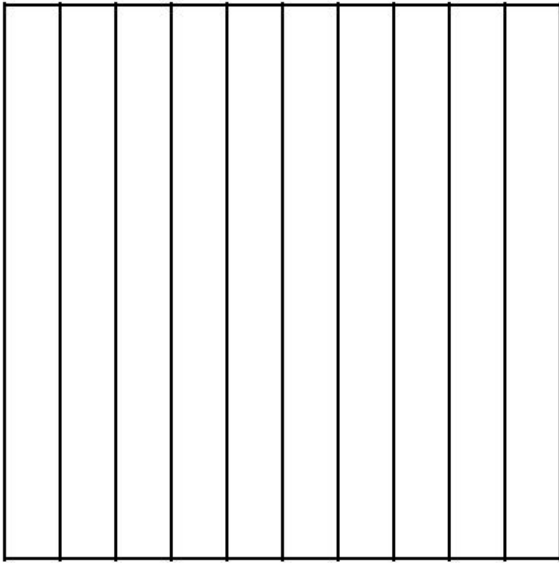
a. $\frac{5}{10} + \frac{53}{100}$

b. $\frac{27}{100} + \frac{8}{10}$

c. $\frac{4}{10} + \frac{78}{100}$

d. $\frac{98}{100} + \frac{7}{10}$

5. Cameron measured $\frac{65}{100}$ inch of rainwater on the first day of April. On the second day of April, he measured $\frac{83}{100}$ inch of rainwater. How many total inches of rainwater did Cameron measure on the first two days of April?



ones	●	tenths	hundredths

area model and place value chart