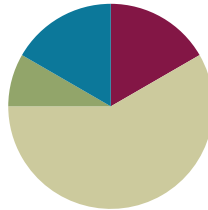


Lesson 10

Objective: Subtract decimals using place value strategies and relate those strategies to a written method.

Suggested Lesson Structure

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



Fluency Practice (10 minutes)

- Take Out the Unit **5.NBT.1** (3 minutes)
- Add Decimals **5.NBT.7** (3 minutes)
- One Less Unit **5.NBT.7** (4 minutes)

Take Out the Unit (3 minutes)

Materials: (S) Personal white boards

Note: Decomposing common units as decimals will strengthen student understanding of place value.

T: (Project $76.358 = \underline{\quad}$.) Say the number.

S: 76 and 358 thousandths.

T: (Write $76.358 = 7$ tens $\underline{\quad}$ thousandths.) On your board, fill in the blank.

S: (Students write $76.358 = 7$ tens 6358 thousandths.)

Repeat the process for tenths and hundredths $76.358 = 763$ tenths $\underline{\quad}$ thousandths, $76.358 = \underline{\quad}$ hundredths 8 thousandths.

Add Decimals (3 minutes)

Materials: (S) Personal white boards

Note: Reviewing this skill that was introduced in Lesson 9 will help students work towards mastery of adding common decimal units.

T: (Write 3 tenths $+ 2$ tenths $= \underline{\quad}$.) Write the addition sentence in decimal form.

S: $0.3 + 0.2 = 0.5$

Repeat the process for 5 hundredths + 4 hundredths and 35 hundredths + 4 hundredths.

One Unit Less (4 minutes)

Materials: (S) Personal white boards

Note: This anticipatory fluency drill will lay a foundation for the concept taught in this lesson.

T: (Write 5 tenths.) Say the decimal that is 1 less than the given unit.

S: 0.4

Repeat the process for 5 hundredths, 5 thousandths, 7 hundredths, and 9 tenths.

T: (Write 0.029.) On your board, write the decimal that is one less thousandth.

S: 0.028

Repeat the process for 1 tenth less than 0.61, 1 thousandth less than 0.061, and 1 hundredth less than 0.549.

Note: *Add Decimals* is a review of skills learned in Lesson 9. The discussion of adding like units provides a bridge to the subtraction of like units which is the topic of today’s lesson.

Application Problems (5 minutes)

At the 2012 London Olympics, Michael Phelps won the gold medal in the men’s 100 meter butterfly. He swam the first 50 meters in 26.96 seconds. The second 50 meters took him 25.39 seconds. What was his total time?

Concept Development (35 minutes)

Materials: (S) Place value chart, personal white boards, markers per student

Problem 1

5 tenths – 3 tenths

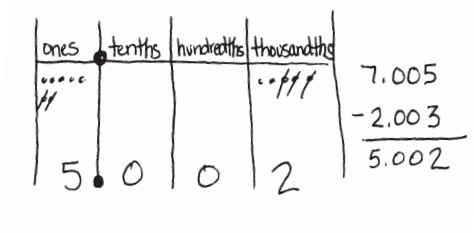
7 ones 5 thousandths – 2 ones 3 thousandths

9 hundreds 5 hundredths – 3 hundredths

T: (Write 5 tenths – 3 tenths = ____ on the board.) Let’s read this expression aloud together. Turn and tell your partner how you’ll solve this problem, then find the difference using your place value chart.

T: Explain your reasoning when solving this subtraction sentence.

S: Since the units are alike we can just subtract. $5 - 3 = 2$.
 → This problem is very similar to 5 ones minus 2 ones, 1 or 5 people minus 2 people; the units may change



but the basic fact $5 - 2 = 3$ is always true.

- T: Find the difference. (Write 7 ones 5 thousandths – 2 ones 3 thousandths = ____ on board.) Solve this with your place value chart and record your thinking vertically, using the algorithm.
- S: (Students solve.)
- T: What did you have to think about as you wrote the problem vertically?
- S: Like units are being subtracted, so my work should also show that. Ones with ones and thousandths with thousandths.
- T: (Write on board.) Solve 9 hundreds 5 hundredths – 3 hundredths = _____. Read carefully, then tell your neighbor how you'll solve this one.
- S: In word form, these units look similar, but they're not. I'll just subtract 3 hundredths from 5 hundredths.
- T: Use your place value chart to help you solve and record your thinking vertically.



**NOTES ON
MULTIPLE MEANS
OF ENGAGEMENT:**

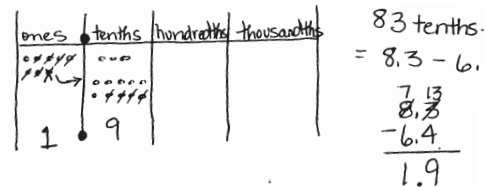
Support oral or written responses with sentence frames, such as ____ is _____ hundredths. Allow the use of place value mats and the frames to scaffold the process of converting units in subtraction. Some students will need concrete materials to support their learning, as renaming in various units may not yet be an abstract construct for them.

Problems 2–3

83 tenths – 6.4

9.2 – 6 ones 4 tenths

- T: (Write 83 tenths – 6.4 = ____ on the board.) How is this problem different from the problems we've seen previously?
- S: These problems will involve regrouping.
- S: (Students solve using disks recording in vertical equation/standard algorithm.)
- T: Share how you solved.
- S: We had to regroup before we could subtract tenths from tenths. Then we subtracted ones from ones, using the same process as whole numbers.

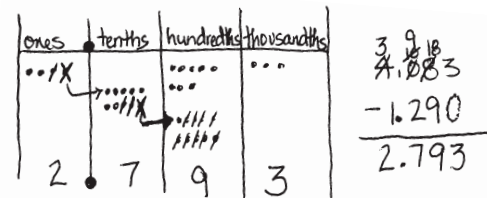


Repeat the sequence with 9.2 – 6 ones 4 tenths. Students may use varying strategies to solve. Comparison of strategies makes for interesting discussion.

0.831 – 0.292

4.003 – 1.29

6 – 4.08



- T: (Write $0.831 - 0.292 = \underline{\quad}$ on the board.) Use your disks to solve. Record your work vertically, using the standard algorithm.
- S: (Students write and share.)
- T: (Write $4.083 - 1.29 = \underline{\quad}$ on the board.) What do you notice about the *thousandths* place? Turn and talk.
- S: There is no digit in the thousandths place in 1.29. → We can think of 29 hundredths as 290 thousandths, but in this case I don't have to change units because there are no thousandths that must be subtracted.
- T: Solve with your disks and record.



**NOTES ON:
MULTIPLE MEANS
OF ENGAGEMENT:**

Students may be more engaged with the concept of adding and subtracting decimal fractions when the teacher reminds them that these are the same skills needed when managing money.

Repeat the sequence with $6 - 0.48$. While some students may use a mental strategy to find the difference, others will use disks to regroup in order to subtract. Continue to stress the alignment based on like units when recording vertically. When the ones place is aligned and students see the missing digits in the minuend of 6 wholes, ask, "How can we think about 6 wholes in the same units as 48 hundredths?" Then lead students to articulate the need to record 6 ones as 600 thousandths or 6.00 in order to subtract vertically. Ask, "By decomposing 6 wholes into 600 thousandths, have we changed its value?" (No, just converted it to smaller units—similar to exchanging six dollars for 600 pennies.)

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 solve these problems using the RDW approach used for Application Problems.

With this Problem Set, it is suggested that students begin with Problems 1–4 and possibly leave Problem 5 to the end if they still have time. Alternatively, be selective about which items from Problems 2 and 3 are required. This will lend time for all to complete Problem 5.

Student Debrief (10 minutes)

Lesson Objective: Subtract decimals using place value strategies and relate those strategies to a written method.

5•1

NYS COMMON CORE MATHEMATICS CURRICULUM

Name Tarini Date _____

1. Subtract then write your difference in standard form. If necessary, you may use a place value chart to find solve.

a. 5 tenths – 2 tenths = 3 tenths = 0.3

b. 5 ones 9 thousandths – 2 ones = 3 ones 9 thousandths = 3.009

c. 7 hundreds 8 hundredths – 4 hundredths = 7 hundreds 4 hundredths 700.04

d. 37 thousandths – 16 thousandths = 21 thousandths = 0.021

2. Solve using the standard algorithm.

a. $1.4 - 0.7 = \underline{0.7}$ $\begin{array}{r} 1.4 \\ - 0.7 \\ \hline 0.7 \end{array}$	b. $91.49 - 0.7 = \underline{90.79}$ $\begin{array}{r} 91.49 \\ - 0.70 \\ \hline 90.79 \end{array}$	c. $191.49 - 10.72 = \underline{180.77}$ $\begin{array}{r} 191.49 \\ - 10.72 \\ \hline 180.77 \end{array}$
d. $7.148 - 0.07 = \underline{7.078}$ $\begin{array}{r} 7.148 \\ - 0.070 \\ \hline 7.078 \end{array}$	e. $60.91 - 2.856 = \underline{58.054}$ $\begin{array}{r} 60.910 \\ - 2.856 \\ \hline 58.054 \end{array}$	f. $361.31 - 2.841 = \underline{358.469}$ $\begin{array}{r} 361.310 \\ - 2.841 \\ \hline 358.469 \end{array}$

COMMON CORE Lesson 10: Use Place Value Strategies to Subtract Decimals and Relate Those Strategies to a Written Method Date: 4/7/13 engage^{ny} 1.D.6

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. You may choose to use any combination of the questions below to lead the discussion.

- How is subtracting decimal fractions the same as subtracting whole numbers? How is it different?
- Look at Problem 2 (a), (b), and (c). What process did you use to find the difference in each of these problems?
- Did you have to use the standard algorithm to solve Problem 3?

Look at Problem 3 (b) and (c). Which was more challenging? Why?

- In Problem 3(f), how did you think about finding the difference between 59 hundredths from 2 ones 4 tenths? Explain your approach.
- How could you change Mrs. Fan’s question in Problem 4 so that Michael’s answer is correct?
- Take time during the debrief to explore any miscues in Problem 5 on the phrase *less than*.

3. Solve.

a. 10 tens – 1 ten 1 tenth $\begin{array}{r} 100.0 \\ - 10.1 \\ \hline 89.9 \end{array}$	b. 3 – 22 tenths $\begin{array}{r} 3.00 \\ - 2.20 \\ \hline 0.80 \end{array}$	c. 37 tenths – 1 one 2 tenths $\begin{array}{r} 3.7 \\ - 1.2 \\ \hline 2.5 \end{array}$
d. 8 ones 9 hundredths – 3.4 $\begin{array}{r} 8.09 \\ - 3.40 \\ \hline 4.69 \end{array}$	e. 5.622 – 3 hundredths $\begin{array}{r} 5.622 \\ - 0.030 \\ \hline 5.592 \end{array}$	f. 2 ones 4 tenths – 0.59 $\begin{array}{r} 2.40 \\ - 0.59 \\ \hline 1.81 \end{array}$

4. Mrs. Fan wrote 5 tenths minus 3 hundredths on the board. Michael said the answer is 2 tenths because 5 minus 3 is 2. Is he correct? Why or why not?

Michael is not correct. He is subtracting units that aren't alike. The problem was 0.5 He was thinking that the problem was 0.5
$$\begin{array}{r} 0.5 \\ - 0.3 \\ \hline \end{array}$$

5. A pen costs \$2.09. It costs \$0.45 less than a marker. Ken paid for one pen and one marker with a five dollar bill. How much change will he receive? Use a tape diagram and show your calculations.

pen 2.09
marker 2.49
Ken's \$ 5
$$\begin{array}{r} 2.09 \\ 2.09 \\ \hline 4.18 \end{array}$$
 ?
pen marker

$$\begin{array}{r} 2.09 \\ + 0.45 \\ \hline 2.54 \end{array}$$

$$\begin{array}{r} 2.54 \\ - 4.65 \\ \hline -2.11 \end{array}$$

$$\begin{array}{r} 2.09 \\ - 4.65 \\ \hline -2.56 \end{array}$$

$$\begin{array}{r} 2.09 \\ - 4.65 \\ \hline -2.56 \end{array}$$

Ken will get 37 cents change.

COMMON CORE Lesson 10: Use Place Value Strategies to Subtract Decimals and Relate Those Strategies to a Written Method
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Exit Ticket (3 minutes)

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help you assess the students’ understanding of the concepts that were presented in the lesson today and plan more effectively for future lessons. You may read the questions aloud to the students.

Name _____

Date _____

1. Subtract, writing the difference in standard form. You may use a place value chart to solve.

a. 5 tenths – 2 tenths = _____ tenths = _____

b. 5 ones 9 thousandths – 2 ones = _____ ones _____ thousandths = _____

c. 7 hundreds 8 hundredths – 4 hundredths = _____ hundreds _____ hundredths = _____

d. 37 thousandths – 16 thousandths = _____ thousandths = _____

2. Solve using the standard algorithm.

a. $1.4 - 0.7 =$ _____	b. $91.49 - 0.7 =$ _____	c. $191.49 - 10.72 =$ _____
d. $7.148 - 0.07 =$ _____	e. $60.91 - 2.856 =$ _____	f. $361.31 - 2.841 =$ _____

3. Solve.

a. 10 tens – 1 ten 1 tenth	b. 3 – 22 tenths	c. 37 tenths – 1 one 2 tenths
d. 8 ones 9 hundredths – 3.4	e. 5.622 – 3 hundredths	f. 2 ones 4 tenths – 0.59

4. Mrs. Fan wrote 5 tenths minus 3 hundredths on the board. Michael said the answer is 2 tenths because 5 minus 3 is 2. Is he correct? Explain.

5. A pen costs \$2.09. It costs \$0.45 less than a marker. Ken paid for one pen and one marker with a five dollar bill. Use a tape diagram with calculations to determine his change.

Name _____

Date _____

1. Subtract.

$$1.7 - 0.8 = \underline{\hspace{1cm}} \text{ tenths} - \underline{\hspace{1cm}} \text{ tenths} = \underline{\hspace{1cm}} \text{ tenths} = \underline{\hspace{1cm}}$$

2. Subtract vertically, showing all work.

a. $84.637 - 28.56 = \underline{\hspace{2cm}}$

b. $7 - 0.35 = \underline{\hspace{2cm}}$

Name _____

Date _____

1. Subtract. You may use a place value chart.

a. 9 tenths – 3 tenths = _____ tenth

b. 9 ones 2 thousandths – 3 ones = _____ ones _____ thousandths

c. 4 hundreds 6 hundredths – 3 hundredths = _____ hundreds _____ hundredths

d. 56 thousandths – 23 thousandths = _____ thousandths
 = _____ hundredths _____ thousandths

2. Solve using the standard algorithm.

<p>a. $1.8 - 0.9 =$ _____</p>	<p>b. $41.84 - 0.9 =$ _____</p>	<p>c. $341.84 - 21.92 =$ _____</p>
<p>d. $5.182 - 0.09 =$ _____</p>	<p>e. $50.416 - 4.25 =$ _____</p>	<p>f. $741. - 3.91 =$ _____</p>

3. Solve.

a. 30 tens – 3 tens 3 tenths	b. 5 – 16 tenths	c. 24 tenths – 1 one 3 tenths
d. 6 ones 7 hundredths – 2.3	e. 8.246 – 5 hundredths	f. 5 ones 3 tenths – 0.53

4. Mr. House wrote 8 tenths minus 5 hundredths on the board. Maggie said the answer is 3 hundredths because 8 minus 5 is 3. Is she correct? Explain.

5. A clipboard costs \$2.23. It costs \$0.58 more than a notebook. Lisa buys two clipboards and one notebook, and paid with a ten dollar bill. Use a tape diagram with calculations to show her change.