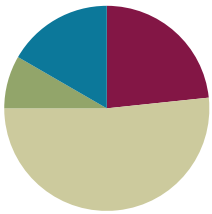
Lesson 9

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

Suggested Lesson Structure



Fluency Practice	(14 minutes)
Application Problems	(5 minutes)
Concept Development	(31 minutes)
Student Debrief	(10 minutes)
Total Time	**(60 minutes)**

Fluency Practice (14 minutes)

- Round to the Nearest One **5.NBT.4** (8 minutes)
- Decompose the Unit **5.NBT.1** (2 minutes)
- Round to Different Place Values **5.NBT.4** (2 minutes)
- One Unit More **5.NBT.7** (2 minutes)

Sprint: Round to the Nearest One (8 minutes)

Materials: (S) Round to the Nearest One Sprint

Note: This Sprint will help students build mastery of rounding to the nearest whole number.

Decompose the Unit (2 minutes)

Materials: (S) Personal white boards

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

T: (Project 6.358.) Say the number.
S: 6 and 358 thousandths.
T: How many tenths are in 6.358?
S: 63 tenths.
T: (Write 6.358 = 63 tenths ____ hundredths.) On your boards, write the number separating the tenths.
S: (Students write 6.358 = 63 tenths 58 thousandths.)

Repeat process for hundredths. Follow the same process for 7.354.

Round to Different Place Values (2 minutes)

Materials: (S) Personal white boards

Note: Reviewing this skill that was introduced in lesson 8 will help students work towards mastery of rounding decimal numbers to different place values.

T: (Project 2.475.) Say the number.
S: 2 and 475 thousandths.
T: On your boards, round the number to the nearest tenth.

Students write 2.475 ≈ 2.5. Repeat the process, rounding 2.457 to the nearest hundredth. Follow the same process, but vary the sequence for 2.987.

One Unit More (2 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's one tenth more than the given value.
S: 0.6

Repeat the process for 5 hundredths, 5 thousandths, 8 hundredths, 3 tenths, and 2 thousandths. Specify the unit to increase by.

T: (Write 0.052.) On your board, write one more thousandth.
S: 0.053

Repeat the process for 1 tenth more than 35 hundredths, 1 thousandth more than 35 hundredths, and 1 hundredth more than 438 thousandths.

Application Problems (5 minutes)

Ten baseballs weigh 1,417.4 grams. About how much does 1 baseball weigh? Round your answer to the nearest tenth of a gram. Round your answer to the nearest gram. If someone asked you, "About how much does a baseball weigh?" which answer would you give? Why?

Note: The application problem requires students to use skills learned in the first part of this module: dividing by powers of ten, and rounding.

Concept Development (31 minutes)

Materials: (S) Place value chart, place value disks

Problems 1–3

2 tenths + 6 tenths

2 ones 3 thousandths + 6 ones 1 thousandth

2 tenths 5 thousandths + 6 hundredths

T: Solve 2 tenths plus 6 tenths using disks on your place value chart. (Write 2 tenths + 6 tenths on the board.)

S: (Students solve.)

T: Say the sentence in words.

S: 2 tenths + 6 tenths = 8 tenths.

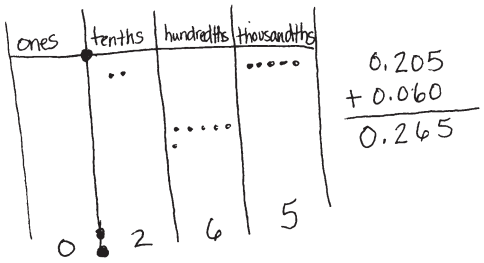
T: How is this addition problem the same as a whole number addition problem? Turn and share with your partner.

S: In order to find the sum, I added like units – tenths with tenths. → 2 tenths plus 6 tenths equals 8 tenths just like 2 apples plus 6 apples equals 8 apples. → Since the sum is 8 tenths, we don't need to bundle or regroup.

T: Work with your partner and solve the next two problems with disks on your place value chart.

NOTES ON MULTIPLE MEANS OF REPRESENTATION:

Understanding the meaning of *tenths*, *hundredths*, and *thousandths* is essential. Proportional manipulatives, such as base ten blocks, can be used to ensure understanding of the vocabulary. Students should eventually move to concrete number disks and/or drawing, which are more efficient.



S: (Students solve.)

T: Let's record our last problem vertically. (Write 0.205 and the plus sign underneath on board.) What do I need to think about when I write my second addend?

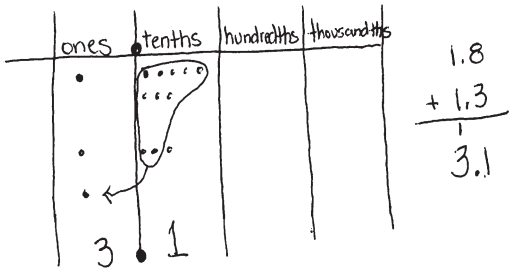
Lead students to see that the vertical written method mirrors the placement of disks on the chart. Like units should be aligned with like units. Avoid procedural language like *line up the decimals*. Students should justify alignment of digits based on place value units.

Problems 4–6

1.8 + 13 tenths

1 hundred 8 hundredths + 2 ones 4 hundredths

148 thousandths + 7 ones 13 thousandths



T: Use your place value chart and disks to show the addends of our next problem. (Write "1.8 + 13 tenths" horizontally on the board.)

S: (Students show.)

T: Tell how you represented these addends. (Students may represent 13 tenths using 13 tenth disks or as 1 one disk and 3 tenths disks. Others may represent 1.8 using mixed units or only tenths.)

S: (Students share.)

T: Which way of composing these addends requires the least amount of drawing? Why?

S: Using ones and tenths because drawing 1 one disk is faster than drawing 10 tenths.

T: Will your choice of units in your drawing affect your answer (sum)?

S: No! Either drawing is OK. It will still give the same answer.

T: Add. Share your thinking with your partner.

S: 1.8 + 13 tenths = 1 and 21 tenths. There are 10 tenths in one whole. I can compose 2 wholes and 11 tenths from 21 tenths, so the answer is 3 and 1 tenth. → 13 tenths is the same as 1 one 3 tenths. 1 one 3 tenths + 1 one 8 tenths = 2 ones 11 tenths which is the same as 3 ones 1 tenth.

MULTIPLE MEANS OF ACTION AND EXPRESSION:

Some students may struggle when asked to turn and talk to another student because they need more time to compose their thoughts. Math journals can be used in conjunction with Turn and Talk as journals provide a venue in which students can use a combination of graphics, symbols and words to help them communicate their thinking.

T: Let's record what we did on our charts. (Lead students to articulate the alignment of digits in the vertical equation based on like units.)

T: What do you notice that was different about this problem? What was the same? Turn and talk.

S: We needed to rename in this problem because 8 tenths and 3 tenths is 11 tenths. → We added ones with ones and tenths with tenths – like units just like before.

T: Work with your partner and solve the next two problems on your place value chart and record your thinking vertically.

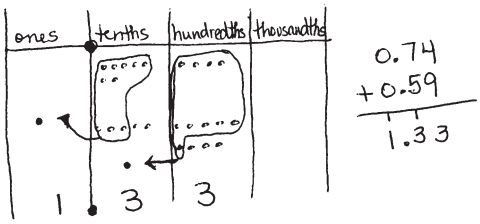
(As students work 148 thousandths + 7 ones 13 thousandths, discuss which composition of 148 thousandths is the more efficient for drawing on a mat.)

Problems 7–9

0.74 + 0.59

7.048 + 5.196

7.44 + 0.774



T: Find the sum of 0.74 and 0.59 with your disks on your place value chart and record.

S: (Students solve.)

T: How is this problem like others we've solved? How was it different?

S: We still add by combining like units—ones with ones, tenths with tenths, hundredths with hundredths but this time we had to bundle in two place value units. We still record our thinking the same way we do with whole numbers—aligning like units.

T: Solve the next two problems using the written method. You may also use your disks to help you. (Show 7.048 + 5.196 and 7.44 + 0.704 on the board.)

S: (Students solve.)

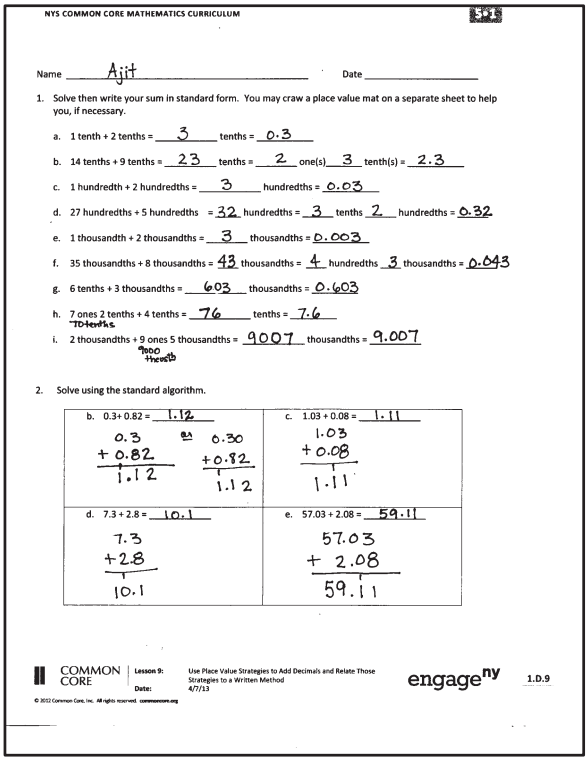
T: How is 7.44 + 0.704 different from the other problems we've worked? Turn and talk.

S: One addend had hundredths, the other had thousandths, but we still had to add like units. → We could think of 44 hundredths as 440 thousandths. → One addend did not have a zero in the ones place. I could leave it like that, or include the zero. The missing zero did not change the quantity.

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..

On this Problem Set, we suggest all students work directly through all problems. Please note that Problem 4 includes the word *pedometer* which may need explanation for some students.



NYS COMMON CORE MATHEMATICS CURRICULUM

Name Ajit Date

1. Solve then write your sum in standard form. You may craw a place value mat on a separate sheet to help you, if necessary.
   a. 1 tenth + 2 tenths = 3 tenths = 0.3
   b. 14 tenths + 9 tenths = 23 tenths = 2 one(s) 3 tenth(s) = 2.3
   c. 1 hundredth + 2 hundredths = 3 hundredths = 0.03
   d. 27 hundredths + 5 hundredths = 32 hundredths = 3 tenths 2 hundredths = 0.32
   e. 1 thousandth + 2 thousandths = 3 thousandths = 0.003
   f. 35 thousandths + 8 thousandths = 43 thousandths = 4 hundredths 3 thousandths = 0.043
   g. 6 tenths + 3 thousandths = 603 thousandths = 0.603
   h. 7 ones 2 tenths + 4 tenths = 76 tenths = 7.6
   i. 2 thousandths + 9 ones 5 thousandths = 9007 thousandths = 9.007

2. Solve using the standard algorithm.

   b. 0.3 + 0.82 = 1.12
   0.3 = 0.30
   +0.82 +0.82
   1.12 1.12

   c. 1.03 + 0.08 = 1.11
   1.03
   +0.08
   1.11

   d. 7.3 + 2.8 = 10.1
   7.3
   +2.8
   10.1

   e. 57.03 + 2.08 = 59.11
   57.03
   + 2.08
   59.11

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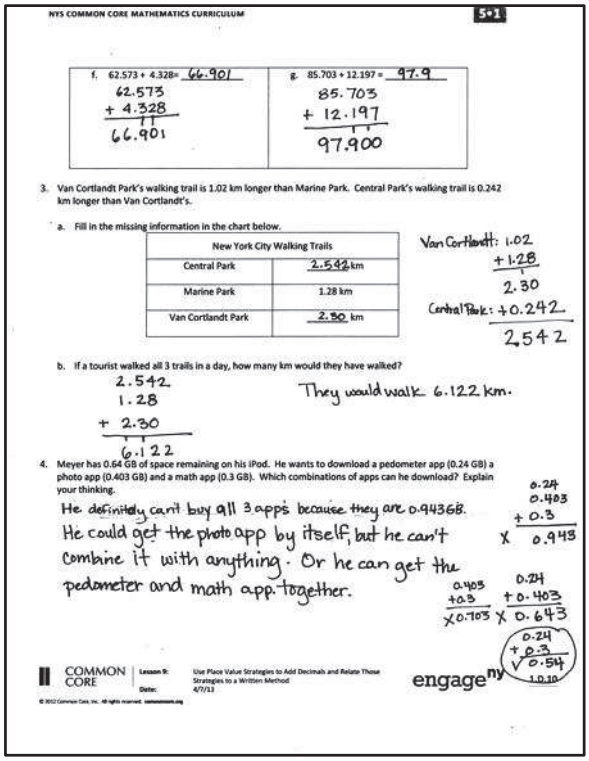
Student Debrief (10 minutes)

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

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.


NYS COMMON CORE MATHEMATICS CURRICULUM 5•1

f. 62.573 + 4.328 = 66.901

62.573
+ 4.328
66.901

g. 85.703 + 12.197 = 97.9

85.703
+ 12.197
97.900

3. Van Cortlandt Park's walking trail is 1.02 km longer than Marine Park. Central Park's walking trail is 0.242 km longer than Van Cortlandt's.

a. Fill in the missing information in the chart below.

New York City Walking Trails	
Central Park	2.542 km
Marine Park	1.28 km
Van Cortlandt Park	2.30 km

Van Cortlandt: 1.02 + 1.28 = 2.30
Central Park: + 0.242 = 2.542

b. If a tourist walked all 3 trails in a day, how many km would they have walked?

2.542
1.28
+ 2.30
6.122

They would walk 6.122 km.

4. Meyer has 0.64 GB of space remaining on his iPod. He wants to download a pedometer app (0.24 GB) a photo app (0.403 GB) and a math app (0.3 GB). Which combinations of apps can he download? Explain your thinking.

He definitely can't buy all 3 apps because they are 0.943GB.
He could get the photo app by itself, but he can't combine it with anything. Or he can get the pedometer and math app. together.

0.24 + 0.403 + 0.3 = 0.943
0.403 + 0.3 = 0.703
0.24 + 0.403 = 0.643
0.24 + 0.3 = 0.54

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- How is adding decimal fractions the same as adding whole numbers? How is it different?
- What are some different words you have used through the grades for changing 10 smaller units for 1 of the next larger units or changing 1 unit for 10 of the next smaller units?
- What do you notice about the addends in letters (b), (d), and (f) in Problem 1? Explain the thought process in solving these problems.
- Did you recognize a pattern in the digits used in Problem 2? Look at each row and column.
- What do you notice about the sum in Problem 2(f)? What are some different ways to express the sum? (Encourage students to name the sum using thousandths, hundredths, and tenths.) How is this problem different from adding whole numbers?
- Ask early finishers to generate addition problems which have 2 decimal place values, but add up to specific sums, like 1 or 2 (e.g., 0.74 + 0.26).

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.

A

Correct _____

Round to the nearest whole number.

1	3.1 ≈		23	12.51 ≈	
2	3.2 ≈		24	16.61 ≈	
3	3.3 ≈		25	17.41 ≈	
4	3.4 ≈		26	11.51 ≈	
5	3.5 ≈		27	11.49 ≈	
6	3.6 ≈		28	13.49 ≈	
7	3.9 ≈		29	13.51 ≈	
8	13.9 ≈		30	15.51 ≈	
9	13.1 ≈		31	15.49 ≈	
10	13.5 ≈		32	6.3 ≈	
11	7.5 ≈		33	7.6 ≈	
12	8.5 ≈		34	49.5 ≈	
13	9.5 ≈		35	3.45 ≈	
14	19.5 ≈		36	17.46 ≈	
15	29.5 ≈		37	11.76 ≈	
16	89.5 ≈		38	5.2 ≈	
17	2.4 ≈		39	12.8 ≈	
18	2.41 ≈		40	59.5 ≈	
19	2.42 ≈		41	5.45 ≈	
20	2.45 ≈		42	19.47 ≈	
21	2.49 ≈		43	19.87 ≈	
22	2.51 ≈		44	69.51 ≈	

B Improvement _____ # Correct _____

Round to the nearest whole number.

1	4.1 ≈		23	13.51 ≈	
2	4.2 ≈		24	17.61 ≈	
3	4.3 ≈		25	18.41 ≈	
4	4.4 ≈		26	12.51 ≈	
5	4.5 ≈		27	12.49 ≈	
6	4.6 ≈		28	14.49 ≈	
7	4.9 ≈		29	14.51 ≈	
8	14.9 ≈		30	16.51 ≈	
9	14.1 ≈		31	16.49 ≈	
10	14.5 ≈		32	7.3 ≈	
11	7.5 ≈		33	8.6 ≈	
12	8.5 ≈		34	39.5 ≈	
13	9.5 ≈		35	4.45 ≈	
14	19.5 ≈		36	18.46 ≈	
15	29.5 ≈		37	12.76 ≈	
16	79.5 ≈		38	6.2 ≈	
17	3.4 ≈		39	13.8 ≈	
18	3.41 ≈		40	49.5 ≈	
19	3.42 ≈		41	6.45 ≈	
20	3.45 ≈		42	19.48 ≈	
21	3.49 ≈		43	19.78 ≈	
22	3.51 ≈		44	59.51 ≈	

Name _____ Date _____

1. Solve then write your sum in standard form. You may draw a place value mat on a separate sheet to help you, if necessary.

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

   b. 14 tenths + 9 tenths = _____ tenths = _____ one(s)_____ tenth(s) = _____

   c. 1 hundredth + 2 hundredths = _____ hundredths = _____

   d. 27 hundredths + 5 hundredths = _____ hundredths = _____ tenths _____ hundredths = _____

   e. 1 thousandth + 2 thousandths = _____ thousandths = _____

   f. 35 thousandths + 8 thousandths = ____ thousandths = ____ hundredths ____ thousandths = _____

   g. 6 tenths + 3 thousandths = _____ thousandths = _____

   h. 7 ones 2 tenths + 4 tenths = _____ tenths = _____

   i. 2 thousandths + 9 ones 5 thousandths = _____ thousandths = _____

2. Solve using the standard algorithm.

a. 0.3+ 0.82 = _____	b. 1.03 + 0.08 = _____
c. 7.3 + 2.8 = _____	d. 57.03 + 2.08 = _____

e. 62.573 + 4.328 = _____	f. 85.703 + 12.197 = _____

3. Van Cortlandt Park's walking trail is 1.02 km longer than Marine Park. Central Park's walking trail is 0.242 km longer than Van Cortlandt's.

   a. Fill in the missing information in the chart below.

New York City Walking Trails	
Central Park	_____ km
Marine Park	1.28 km
Van Cortlandt Park	_____ km

   b. If a tourist walked all 3 trails in a day, how many km would they have walked?

4. Meyer has 0.64 GB of space remaining on his iPod. He wants to download a pedometer app (0.24 GB) a photo app (0.403 GB) and a math app (0.3 GB). Which combinations of apps can he download? Explain your thinking.

Name _____ Date _____

1. Solve.
   a. 4 hundredths + 8 hundredths = _____ hundredths = _____ tenths _____ hundredths

   b. 64 hundredths + 8 hundredths = _____ hundredths = _____ tenths _____ hundredths

2. Solve using the standard algorithm.

a. 2.40 + 1.8 = _____	b. 36.25 + 8.67 = _____

Name _____ Date _____

1. Solve.

   a. 3 tenths + 4 tenths = _____ tenths

   b. 12 tenths + 9 tenths = _____ tenths = _____ one(s) _____ tenth(s)

   c. 3 hundredths + 4 hundredths = _____ hundredths

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

   e. 4 thousandth + 3 thousandths = _____ thousandths

   f. 39 thousandths + 5 thousandths = ____ thousandths = ____ hundredths ____ thousandths

   g. 5 tenths + 7 thousandths = _____ thousandths

   h. 4 ones 4 tenths + 4 tenths = _____ tenths

   i. 8 thousandths + 6 ones 8 thousandths = _____ thousandths

2. Solve using the standard algorithm.

a. 0.4 + 0.7 = _____	b. 2.04 + 0.07 = _____
c. 6.4 + 3.7 = _____	d. 56.04 + 3.07 = _____

e. 72.564 + 5.137 = _____	f. 75.604 + 22.296 = _____

3. Walkway Over the Hudson, a bridge that crosses the Hudson River in Poughkeepsie, is 2.063 kilometers. Anping Bridge, which was built in China 850 years ago, is 2.07 kilometers long.

   a. Which bridge is longer? How much longer? Show your thinking.

   b. Leah likes to walk her dog on the Walkway Over the Hudson. If she walks across and back, how far do she and her dog walk?

4. For his parents' anniversary, Danny spends $5.87 on a photo. He also buys 3 balloons for $2.49 each and a box of strawberries for $4.50. How much money does he spend all together?