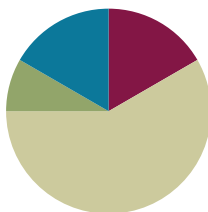


Lesson 11

Objective: Multiply a decimal fraction by single-digit whole numbers, relate to a written method through application of the area model and place value understanding, and explain the reasoning used.

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** (4 minutes)
- Add and Subtract Decimals **5.NBT.7** (6 minutes)

Take Out the Unit (4 minutes)

Materials: (S) Personal white boards

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

T: (Project $1.234 = \underline{\quad}$ thousandths.) Say the number. Think about the how many thousandths in 1.234.

T: (Project $1.234 = 1234$ thousandths.) How much is one thousand, thousandths?

S: One thousand, thousandths is the same as 1.

T: (Project $65.247 = \underline{\quad}$.) Say the number.

S: 65 ones 247 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 hundredths $76.358 = 736$ tenths $\underline{\quad}$ thousandths, $76.358 = \underline{\quad}$ hundredths 8 thousandths.

Add and Subtract Decimals (6 minutes)

Materials: (S) Personal white boards

Note: Reviewing these skills that were introduced in Lessons 9 and 10 will help students work towards mastery of adding and subtracting common decimal units.

T: (Write 7258 thousandths + 1 thousandth = ____.) Write the addition sentence in decimal form.

S: $7.258 + 0.001 = 7.259$.

Repeat the process for 7 ones 258 thousandths + 3 hundredths, 7 ones 258 thousandths + 4 tenths, 6 ones 453 thousandths + 4 hundredths, 2 ones 37 thousandths + 5 tenths, and 6 ones 35 hundredths + 7 thousandths.

T: (Write 4 ones 8 hundredths – 2 ones = ____ ones ____ hundredths.) Write the subtraction sentence in decimal form.

S: (Students write $4.08 - 2 = 2.08$.)

Repeat the process for 9 tenths 7 thousandths – 4 thousandths, 4 ones 582 thousandths – 3 hundredths, 9 ones 708 thousandths – 4 tenths, and 4 ones 73 thousandths – 4 hundredths.

Application Problems (5 minutes)

After school, Marcus ran 3.2km and Cindy ran 1.95km. Who ran farther? How much farther?

Note: This application problem requires students to subtract decimal numbers as studied in Lesson 10.

Concept Development (35 minutes)

Materials: (S) Personal white boards with place value charts, number disks

Problems 1–3

$3 \times 0.2 = 0.6$

$3 \times 0.3 = 0.9$

$4 \times 0.3 = 1.2$

T: Place disks to show 2 tenths on your place value chart.

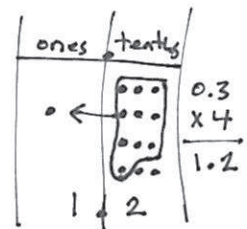
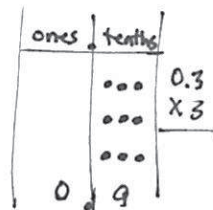
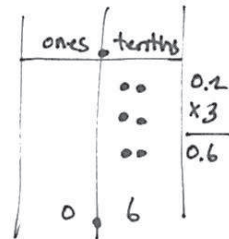
S: (Students draw.)

T: Make 3 copies of 2 tenths using number disks. How many tenths do you have in all?

S: Six tenths.

T: Turn to your partner and write a number sentence to express how we made 6 tenths.

S: I wrote $0.2 + 0.2 + 0.2 = 0.6$ because I added 2 tenths



MP.7

three times to get 6 tenths. → I multiplied 2 tenths by 3 and got 6 tenths so I wrote $3 \times 0.2 = 0.6$.

- T: (Write on the board.) Complete the sentence: 3 copies of 2 tenths is _____; and read the equation in unit form: $3 \times 0.2 = 0.6$.
- S: 6 tenths; 3×2 tenths = 6 tenths.
- T: Work with your partner to find the value of 3×0.3 and 4×0.3 .
- S: (Students work and solve.)
- T: How was 4×3 tenths different from 3×3 tenths?
- S: I had to bundle the 10 tenths and made 1 one and had 2 tenths left, which I didn't do before. → We made a number greater than 1 whole.
- T: 4 copies of 3 tenths is 12 tenths. (Show on place value chart.) 12 tenths is the same as _____.
- S: 1 one and 2 tenths.



**NOTES ON
MULTIPLE MEANS
OF ACTION AND
EXPRESSION:**

The area model can be considered a graphic organizer. It organizes the partial products. Some students may need support in order to remember which product goes in each cell of the area model especially as the model becomes more complex. Teachers can modify the organizer by writing the expressions in each cell. This might eliminate the need for some students to visually track the product into the appropriate cell.

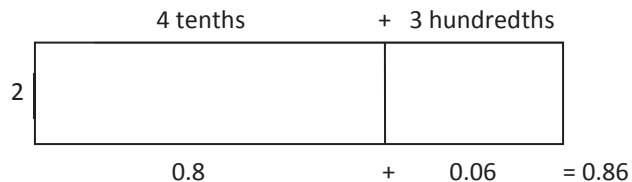
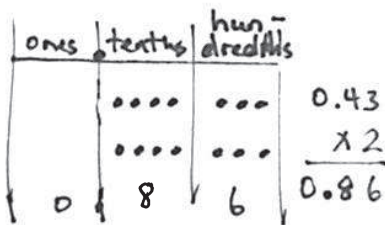
Problems 4–6

$2 \times 0.43 = 0.86$

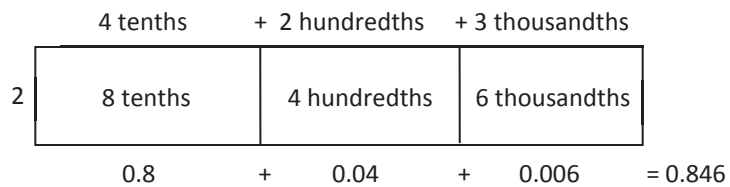
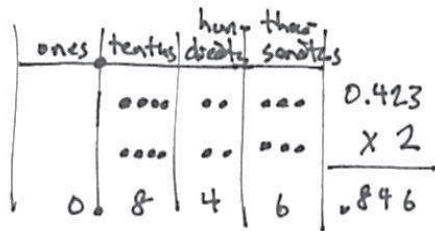
$2 \times 0.423 = 0.846$

$4 \times 0.423 = 1.692$

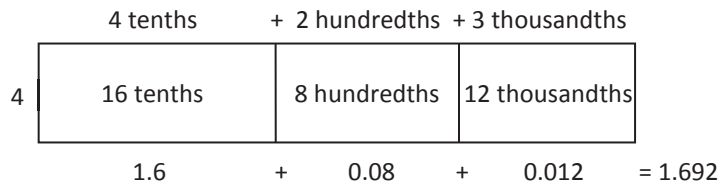
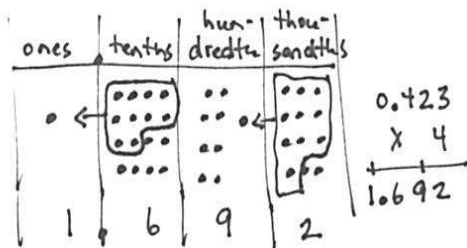
- T: (Write on chart.) $2 \times 0.43 =$ _____. How can we use our knowledge from the previous problems to solve this?
- S: We make copies of hundredths like we make copies of tenths. → Hundredths is a different unit, but we can multiply it just like tenths.
- T: Use your place value chart to find the product of 2×0.43 . Complete the sentence, “2 copies of 43 hundredths is _____.”
- S: (Students work.)
- T: Read what your place value chart shows.
- S: I have 2 groups of 4 tenths and 2 groups of 3 hundredths. I need to combine tenths with tenths and hundredths with hundredths.



- T: (Teacher draws an area model.) Let me record what I hear you saying. Discuss with your partner the difference between these two models.
- S: (Share observations.)
- T: (Write on board.) $2 \times 0.423 = \underline{\hspace{2cm}}$. What is different about this problem?
- S: There is a digit in the thousandths place. \rightarrow We are multiplying thousandths.
- T: Use your mat to solve this problem.
- S: (Students work.)
- T: Read what your place value chart shows.
- S: 846 thousandths.



- T: Now, draw an area model and write an equation with the partial products to show how you found the product.
- S: (Students draw.)
- T: (Write $4 \times 0.423 = \underline{\hspace{2cm}}$ on board.) Solve this with your disks.
- S: (Students solve.)



- T: Read the number that is shown on your chart.
 S: 1 and 692 thousandths.
 T: How was this problem different from the last?
 S: 4 times 3 thousandths is 12 thousandths, so we had to bundle 10 thousandths to make 1 hundredth.
 T: Did any other units have to be regrouped?
 S: In the tenths place. Four times 4 tenths is 16 tenths, so we had to regroup 10 tenths to make 1 whole.
 T: Let's record what happened on our mat using an area model and an equation showing the partial products.



NOTES ON MULTIPLE MEANS OF ENGAGEMENT:

It can be highly motivating for students to recognize their progress. Teachers can help students do this by creating a list of skills and concepts the students will master in this module. The students can keep track as the module and their skills progress.

Problems 7–9

(Use area model to represent distributive property.)

$$6 \times 1.21$$

$$7 \times 2.41$$

$$8 \times 2.34$$

- T: (Write on board.) 6×1.21 . Let's imagine our disks, but use an area model to represent our thinking as we find the product of 6 times 1 and 21 hundredths.
 T: (Draw area model on board.) On our area model, how many sections do we have?
 S: 3. We have one for each place.
 T: (Draw area model.) I have a section for 1 whole, 2 tenths, and 1 hundredth. I am multiplying each by what number?
 S: 6.
 T: With a partner, solve the equation using the area model and an equation which shows the partial products.
 S: (Students work with a partner.)

Have students solve the last two equations using area models and recording equations. Circulate looking for any misconceptions.

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.

Student Debrief (10 minutes)

Lesson Objective: Multiply a decimal fraction by single-digit whole numbers, relate to a written method through application of the area model and place value understanding, and explain the reasoning used.

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.


- Compare student work in Problems 1(c) and 1(d) as some students may regroup units while others may not. Give opportunity for students to discuss the equality of the various unit decompositions. Give other examples (e.g., 6×0.25) asking students to defend the equality of 1.50, 150 hundredths, and 1.5 with words, models, and numbers.
- Problem 3 points out a common error in student thinking when multiplying decimals by whole numbers. Allow students to share their models for correcting Miles' error. Students should be able to articulate which units are being multiplied and composed into larger ones.
- Problem 3 also offers an opportunity to extend understanding by asking students to generate an area model and/or an equation using 6 as a multiplier that would make Miles' answer correct.


NYS COMMON CORE MATHEMATICS CURRICULUM 5•1


Name Shannon Date _____


1. Solve by drawing disks on a place value chart. Write an equation and express the product in standard form.


a. 3 copies of 2 tenths = 0.2×3
 = 0.6

b. 5 groups of 2 hundredths = 0.02×5
 = 0.1

c. 3 times 6 tenths = 0.6×3
 = 1.8

d. 6 times 4 hundredths = 0.04×6
 = 0.24

e. 5 times as much as 7 tenths = 0.7×5
 = 3.5

f. 4 thousandths times 3 = 0.04×3
 = 0.12

2. Draw a model similar to the one pictured below. Find the sum of the partial products to evaluate each expression.

a. 7×3.12

	3 ones	+ 1 tenth	+ 2 hundredths
7	7 x 3 ones	7 x 1 tenth	7 x 2 hundredths

21 + 0.7 + 0.14 = 21.84

b. 6×4.25

	4 ones	+ 2 tenths	+ 5 hundredths
6	24 ones	12 tenths	30 hundredths

24 + 1.2 + 0.30 = 25.5

COMMON CORE Lesson 11: Apply the Area Model and Place Value Understanding to Multiply a Decimal Fraction by Single-Digit Whole Numbers and Relate to a Written Method
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NYS COMMON CORE MATHEMATICS CURRICULUM 5•1

c. 3 copies of 4.65

	4 ones	6 tenths	5 hundredths
3	12 ones	18 tenths	15 hundredths

12 + 1.8 + 0.15 = 13.95

d. 4 times as much as 20.075

	2 tens	7 tenths	5 hundredths
4	8 tens	28 tenths	20 hundredths

80 + 0.28 + 0.020 = 80.28 or 80.3

3. Miles incorrectly gave the product of 7×2.6 as 14.42. Use a place value chart or an area model to help Miles understand his mistake.

	2 ones	6 tenths
7	14 ones	42 tenths

14 + 4.2 = 18.2

This is where Miles made his mistake. He wrote 42 hundredths instead of bundling his tenths to make ones.

4. Mrs. Zamir wants to buy 8 protractors and some erasers for her classroom. She has \$30. If protractors cost \$2.65 each, how much will Mrs. Zamir have left to buy erasers?

Mrs. Z's \$

30	2.65	2.65	...	2.65	2.65	?
----	------	------	-----	------	------	---

 } 30
 protractors erasers

	2 tens	4 tenths	5 hundredths
8	16 tens	16 tenths	40 hundredths

16 + 4.8 + 0.40 = 21.20

\$30.00	- 21.20	= 8.80
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Mrs. Zamir will have \$8.80 to buy erasers.

COMMON CORE Lesson 11: Apply the Area Model and Place Value Understanding to Multiply a Decimal Fraction by Single-Digit Whole Numbers and Relate 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. Solve by drawing disks on a place value chart. Write an equation and express the product in standard form.

a. 3 copies of 2 tenths

b. 5 groups of 2 hundredths

c. 3 times 6 tenths

d. 6 times 4 hundredths

e. 5 times as much as 7 tenths

f. 4 thousandths times 3

2. Draw a model similar to the one pictured below for Parts (b), (c), and (d). Find the sum of the partial products to evaluate each expression.

a. 7×3.12

	3 ones	+	1 tenth	+	2 hundredths	
7	7 x 3 ones	7 x 1 tenth	7 x 2 hundredths			
	_____	+	_____	+	0.14	= _____

b. 6×4.25

- c. 3 copies of 4.65
- d. 4 times as much as 20.075
3. Miles incorrectly gave the product of 7×2.6 as 14.42. Use a place value chart or an area model to help Miles understand his mistake.
4. Mrs. Zamir wants to buy 8 protractors and some erasers for her classroom. She has \$30. If protractors cost \$2.65 each, how much will Mrs. Zamir have left to buy erasers?

Name _____

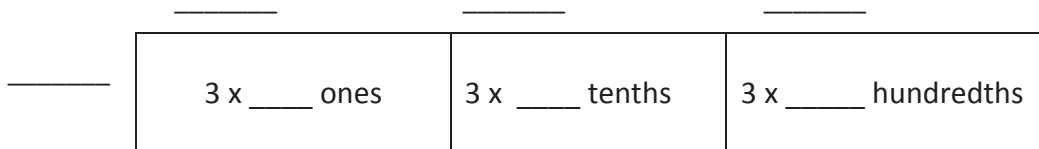
Date _____

1. Solve by drawing disks on a place value chart. Write an equation and express the product in standard form.

4 copies of 3 tenths

2. Complete the area model, and then find the product.

$$3 \times 9.63$$



Name _____

Date _____

1. Solve by drawing disks on a place value chart. Write an equation and express the product in standard form.

a. 2 copies of 4 tenths

b. 4 groups of 5 hundredths

b. 4 times 7 tenths

d. 3 times 5 hundredths

c. 9 times as much as 7 tenths

f. 6 thousandths times 8

2. Draw a model similar to the one pictured below. Find the sum of the partial products to evaluate each expression.

a. 4×6.79

	6 ones	+	7 tenths	+	9 hundredths	
4	4 x 6 ones	4 x 7 tenths	4 x 9 hundredths			
	_____	+	_____	+	_____	= _____

- b. 6×7.49 hundredths
- c. 9 copies of 3.65
- d. 3 times 20.175
3. Leanne multiplied 8×4.3 and got 32.24. Is Leanne correct? Use an area model to explain your answer.
4. Anna buys groceries for her family. Hamburger meat is \$3.38 per pound, sweet potatoes are \$0.79 each, and hamburger rolls are \$2.30 a bag. If Anna buys 3 pounds of meat, 5 sweet potatoes, and one bag of hamburger rolls, what will she pay in all for the groceries?