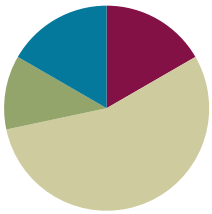
Lesson 12

Objective: Reason about the product of a whole number and a decimal with hundredths using place value understanding and estimation.

Suggested Lesson Structure

Fluency Practice	(10 minutes)
Application Problem	(7 minutes)
Concept Development	(33 minutes)
Student Debrief	(10 minutes)
Total Time	**(60 minutes)**



Fluency Practice (10 minutes)

- Unit Conversions **5.MD.1** (5 minutes)
- State the Decimal **5.NBT.3** (5 minutes)

Unit Conversions (5 minutes)

Materials: (S) Personal white board

Note: Reviewing this fluency activity builds a foundation for upcoming Topic D lessons on measurement problem solving.

T: (Write 12 in = ____ ft.) 12 inches is the same as how many feet?
S: 1 foot.

Repeat the process for possible sequence: 24 in, 36 in, 48 in, and 120 in.

T: (Write 1 ft = ____ in.) 1 foot is the same as how many inches?
S: 12 inches.

Repeat the process and procedure for 2 ft, 2.5 ft, 3 ft, 3.5 ft, 4 ft, 4.5 ft, 9 ft, 9.5 ft, 27 ft, and 27.5 ft.

State the Decimal (5 minutes)

Note: This fluency activity reviews G5–Module 1's concepts.

T: Say the number as you would write it. 8 tenths.
S: Zero point eight.

Repeat process using the following possible sequence: 9 tenths, 10 tenths, 11 tenths, 19 tenths, 20 tenths, 30 tenths, 35 tenths, 45 tenths, 85 tenths, 83 tenths, 63 tenths, and 47 tenths.

T: Say the number as you would write it. 8 hundredths.

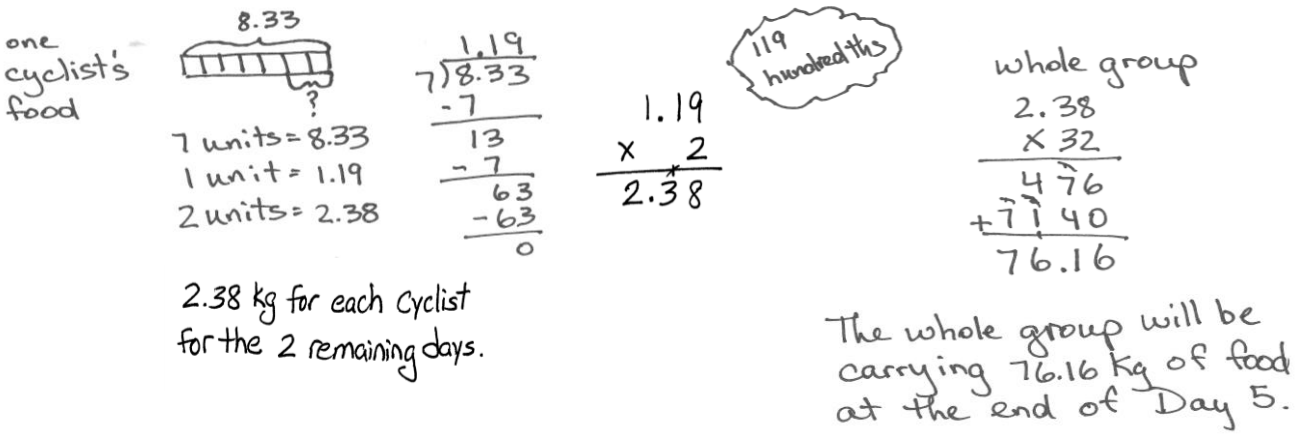
S: Zero point zero eight.

Repeat the process for the following possible sequence: 9 hundredths, 10 hundredths, 20 hundredths, 30 hundredths, 90 hundredths, 95 hundredths, 99 hundredths, 199 hundredths, 299 hundredths, 357 hundredths, and 463 hundredths.

Application Problem (7 minutes)

MP.2
MP.4

Thirty-two cyclists make a seven-day trip. Each cyclist requires 8.33 kilograms of food for the entire trip. If each cyclist wants to eat an equal amount of food each day, how many kilograms of food will the group be carrying at the end of Day 5?



Note: This problem asks students to divide a decimal by a whole number, a skill learned in Module 1. Students also need to multiply a decimal by a two-digit whole number, which is the focus of today's lesson. Accept any valid approach to solving the problem.

Concept Development (33 minutes)

The time allotted for Lesson 12's Concept Development can be used to consolidate the learning that has occurred in Lessons 10 and 11. Three sets of problems have been provided for students who are ready to extend their decimal multiplication knowledge. The teaching sequence from the aforementioned lessons may be used to guide instruction. Students should be encouraged to imagine the area model while writing the algorithm, as well as verbalize the thinking of multiplying and dividing by 10 and 100.

NOTES ON MULTIPLE MEANS OF ACTION AND EXPRESSION:

By this point in the module, students will most certainly differ in their independence with decimal multiplication. Continue to allow students to use area models as a support for finding products. Give students who are comfortable in their knowledge of the algorithm freedom to simply compute the products without drawing the area model.

Note: Problems 7–9 involve decimals less than 1. This is intended to serve as a challenge set for advanced learners.

Problems 1–3	Problems 4–6	Problems 7–9
2.31 × 22 =	495 × 1.11=	2.5 × 51 =
2.31 × 221 =	0.98 × 495 =	0.25 × 51 =
2.31 × 201=	102.64 × 495 =	0.56 × 84 =

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.

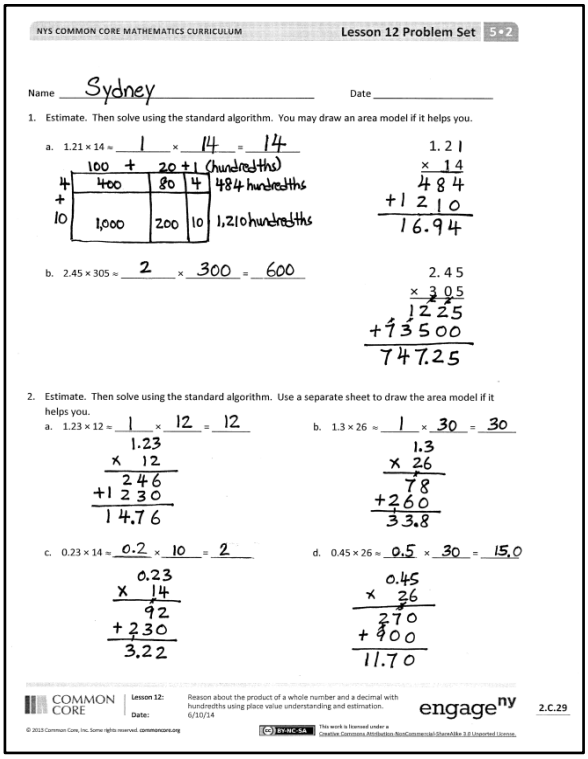
Student Debrief (10 minutes)

Lesson Objective: Reason about the product of a whole number and a decimal with hundredths using place value understanding and estimation.

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.

- Discuss the estimates for Problems 2(b) and 2(d). Have students notice that, in 2(b), 26 is multiplied by a factor a bit more than 1, and in 2(d), by a factor less than 1. What effect does this have on the products?
- Continue to discuss the relationships between the actual problem and parallel whole number problem they use to obtain the digits of the product. Have them articulate the adjustments that must be made to the products to answer the actual multiplication sentence. (If I think about 1.24 as hundredths, I must multiply by 100, but my product must be adjusted by dividing by 100.)


NYS COMMON CORE MATHEMATICS CURRICULUM Lesson 12 Problem Set 5•2

Name Sydney Date

1. Estimate. Then solve using the standard algorithm. You may draw an area model if it helps you.

a. 1.21 × 14 ≈ 1 × 14 = 14

100 + 20 + 1 (hundredths)

4 + 10: 400 | 80 | 4 (484 hundredths); 1,000 | 200 | 10 (1,210 hundredths)

1.21 × 14 = 16.94

b. 2.45 × 305 ≈ 2 × 300 = 600

2.45 × 305 = 747.25

2. Estimate. Then solve using the standard algorithm. Use a separate sheet to draw the area model if it helps you.

a. 1.23 × 12 ≈ 1 × 12 = 12

1.23 × 12 = 14.76

b. 1.3 × 26 ≈ 1 × 30 = 30

1.3 × 26 = 33.8

c. 0.23 × 14 ≈ 0.2 × 10 = 2

0.23 × 14 = 3.22

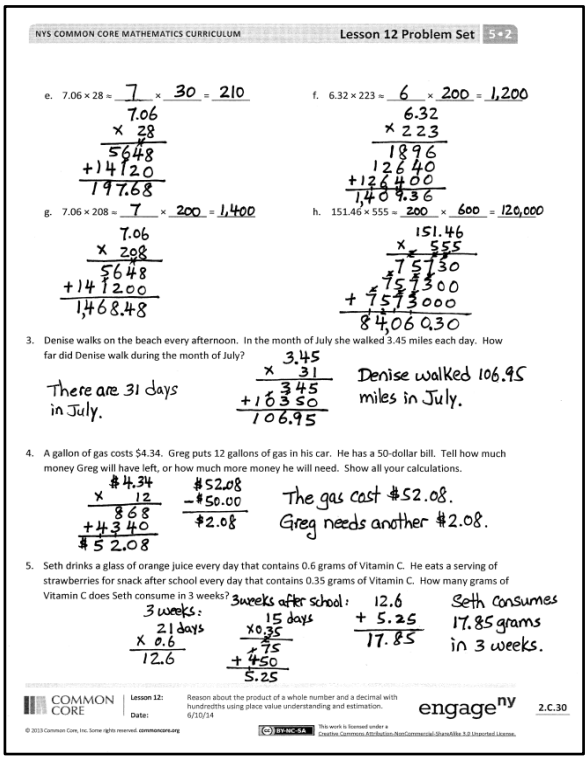
d. 0.45 × 26 ≈ 0.5 × 30 = 15.0

0.45 × 26 = 11.70

COMMON CORE | Lesson 12: Date: | Reason about the product of a whole number and a decimal with hundredths using place value understanding and estimation. 6/10/14 | engage^ny | 2.C.29

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.



NYS COMMON CORE MATHEMATICS CURRICULUM Lesson 12 Problem Set 5•2

e. 7.06 × 28 ≈ 7 × 30 = 210

7.06 × 28 = 197.68

f. 6.32 × 223 ≈ 6 × 200 = 1,200

6.32 × 223 = 1409.36

g. 7.06 × 208 ≈ 7 × 200 = 1,400

7.06 × 208 = 1,468.48

h. 151.46 × 555 ≈ 200 × 600 = 120,000

151.46 × 555 = 84,060.30

3. Denise walks on the beach every afternoon. In the month of July she walked 3.45 miles each day. How far did Denise walk during the month of July?

There are 31 days in July.

3.45 × 31 = 106.95

Denise walked 106.95 miles in July.

4. A gallon of gas costs $4.34. Greg puts 12 gallons of gas in his car. He has a 50-dollar bill. Tell how much money Greg will have left, or how much more money he will need. Show all your calculations.

$4.34 × 12 = $52.08

$52.08 − $50.00 = $2.08

The gas cost $52.08.

Greg needs another $2.08.

5. Seth drinks a glass of orange juice every day that contains 0.6 grams of Vitamin C. He eats a serving of strawberries for snack after school every day that contains 0.35 grams of Vitamin C. How many grams of Vitamin C does Seth consume in 3 weeks?

3 weeks: 21 days × 0.6 = 12.6

3 weeks after school: 15 days × 0.35 = 5.25

12.6 + 5.25 = 17.85

Seth consumes 17.85 grams in 3 weeks.

COMMON CORE | Lesson 12: Reason about the product of a whole number and a decimal with hundredths using place value understanding and estimation. Date: 6/10/14 engage^ny 2.C.30

Name _____ Date _____

1. Estimate. Then, solve using the standard algorithm. You may draw an area model if it helps you.

   a. 1.21 × 14 ≈ _____ × _____ = _____

   $$\begin{array}{r} 1.21 \\ \times \quad 14 \\ \hline \end{array}$$

   b. 2.45 × 305 ≈ _____ × _____ = _____

   $$\begin{array}{r} 2.45 \\ \times \quad 305 \\ \hline \end{array}$$

2. Estimate. Then, solve using the standard algorithm. Use a separate sheet to draw the area model if it helps you.

   a. 1.23 × 12 ≈ _____ × _____ = _____

   b. 1.3 × 26 ≈ _____ × _____ = _____

   c. 0.23 × 14 ≈ _____ × _____ = _____

   d. 0.45 × 26 ≈ _____ × _____ = _____

e. $7.06 \times 28 \approx$ _____ × _____ = _____

f. $6.32 \times 223 \approx$ _____ × _____ = _____

g. $7.06 \times 208 \approx$ _____ × _____ = _____

h. $151.46 \times 555 \approx$ _____ × _____ = _____

3. Denise walks on the beach every afternoon. In the month of July, she walked 3.45 miles each day. How far did Denise walk during the month of July?

4. A gallon of gas costs $4.34. Greg puts 12 gallons of gas in his car. He has a 50-dollar bill. Tell how much money Greg will have left, or how much more money he will need. Show all your calculations.

5. Seth drinks a glass of orange juice every day that contains 0.6 grams of Vitamin C. He eats a serving of strawberries for snack after school every day that contains 0.35 grams of Vitamin C. How many grams of Vitamin C does Seth consume in 3 weeks?

Name _____ Date _____

1. Estimate. Then, solve using the standard algorithm.

   a. $3.03 \times 402 \approx$ _____ × _____ = _____

   b. $667 \times 1.25 \approx$ _____ × _____ = _____

Name _____ Date _____

1. Estimate. Then, solve using the standard algorithm. You may draw an area model if it helps you.

   a. 24 × 2.31 ≈ _____ × _____ = _____

   $$\begin{array}{r} 2.31 \\ \times \quad 24 \\ \hline \end{array}$$

   b. 5.42 × 305 ≈ _____ × _____ = _____

   $$\begin{array}{r} 5.42 \\ \times 305 \\ \hline \end{array}$$

2. Estimate. Then, solve using the standard algorithm. Use a separate sheet to draw the area model if it helps you.

   a. 1.23 × 21 ≈ _____ × _____ = _____

   b. 3.2 × 41 ≈ _____ × _____ = _____

   c. 0.32 × 41 ≈ _____ × _____ = _____

   d. 0.54 × 62 ≈ _____ × _____ = _____

e. $6.09 \times 28 \approx$ _____ × _____ = _____

f. $6.83 \times 683 \approx$ _____ × _____ = _____

g. $6.09 \times 208 \approx$ _____ × _____ = _____

h. $171.76 \times 555 \approx$ _____ × _____ = _____

3. Eric's goal is to walk 2.75 miles to and from the park every day for an entire year. If he meets his goal, how many miles will Eric walk?

4. Art galleries often price paintings by the square inch. If a painting measures 22.5 inches by 34 inches and costs $4.15 per square inch, what is the selling price for the painting?

5. Gerry spends $1.25 each day on lunch at school. On Fridays, she buys an extra snack for $0.55. How much money will she spend in two weeks?