



Lesson 11: Fraction Multiplication and the Products of Decimals

Student Outcomes

- Students use estimation and place value to determine the placement of the decimal point in products and to determine that the size of the product is relative to each factor.
- Students discover and use connections between fraction multiplication and decimal multiplication.
- Students recognize that the sum of the number of decimal digits in the factors yields the decimal digits in the product.

Lesson Notes

To complete this lesson, students will need large poster paper and markers so that they can present their detailed solutions to the Exploratory Challenge.

Classwork

Exploratory Challenge (20 minutes)

Students work in small groups to complete the two given problems. After finding each product, group members will use previous knowledge to convince their classmates that the product has the decimal in the correct location.

- Students will solve their problems on poster paper using the markers provided.
- On the poster paper, students will include all work that supports their solutions and the placement of the decimal in the answer. You may need to prompt students about their previous work with rounding and multiplication of mixed numbers.
- All groups, even those whose solutions or supporting work contain errors, will present their solutions and explain their supporting work. Having the decimal in the wrong place will allow for a discussion on why the decimal placement is incorrect. Since all groups are presenting, allow each group to present only one method of proving where the decimal should be placed.

MP.1
MP.6
&
MP.7

Exploratory Challenge

You will not only solve each problem, but your groups will also need to prove to the class that the decimal in the product is located in the correct place. As a group, you will be expected to present your informal proof to the class.

1. Calculate the product. 34.62×12.8

$$34.62 \times 12.8 = 443.136$$

Some possible proofs:

Using estimation: $35 \times 13 = 455$. If the decimal was located in a different place, the product would not be close to 455.

Using fractions: $34\frac{62}{100} \times 12\frac{8}{10} = \frac{3,462}{100} \times \frac{128}{10} = \frac{443,136}{1,000}$. Because the denominator is 1,000, the last digit should be in the thousandths place when writing the fraction as a decimal. Therefore, the answer would be 443.136.

2. Xavier earns \$11.50 per hour working at the nearby grocery store. Last week, Xavier worked 13.5 hours. How much money did Xavier earn last week? Remember to round to the nearest penny.

$$11.5 \times 13.5 = 155.25$$

Some possible proofs:

Using estimation: $12 \times 14 = 168$. If the decimal was located in a different place, the product would not be close to 168.

Using fractions: $11\frac{5}{10} \times 13\frac{5}{10} = \frac{115}{10} \times \frac{135}{10} = \frac{15,525}{100}$. Because the denominator is 100, the last digit should be in the hundredths place when writing the fraction as a decimal. Therefore, the answer would be \$155.25.

Discussion (5 minutes)

- Do you see a connection between the number of decimal digits in the factors and the product?
 - In the first problem, there are two decimal digits in the first factor and one decimal digit in the second factor, which is a total of three decimal digits. The product has three decimal digits.
 - In the second problem, both factors have one decimal digit for a total of two decimal digits in the factors. The product also has two decimal digits.

Show students that this is another way to determine if their decimal point is in the correct place. If this point was brought up by students in their presentations, the discussion can reiterate this method to find the correct placement of the decimal. Remind students to place the decimal before eliminating any unnecessary zeros from the answer.

At the end of the discussion, have students record notes on decimal placement in the student materials.

Discussion

Record notes from the discussion in the box below.

Exercises 1–4 (10 minutes)**MP.6**

Students work individually to solve the four practice problems. Emphasize the importance of decimal placement to hold place value.

Exercises 1–4

1. Calculate the product: 324.56×54.82 .

$$324.56 \times 54.82 = 17,792.3792$$

2. Kevin spends \$11.25 on lunch every week during the school year. If there are 35.5 weeks during the school year, how much does Kevin spend on lunch over the entire school year? Remember to round to the nearest penny.

$$11.25 \times 35.5 = 399.375 \approx 399.38$$

Kevin would spend \$399.38 on lunch over the entire school year.

3. Gunnar's car gets 22.4 miles per gallon, and his gas tank can hold 17.82 gallons of gas. How many miles can Gunnar travel if he uses all of the gas in the gas tank?

$$22.4 \times 17.82 = 399.168$$

Gunnar can drive 399.168 miles on an entire tank of gas.

4. The principal of East High School wants to buy a new cover for the sand pit used in the long jump competition. He measured the sand pit and found that the length is 29.2 feet and the width is 9.8 feet. What will the area of the new cover be?

$$29.2 \times 9.8 = 286.16$$

The cover should have an area of 286.16 square feet.

Closing (5 minutes)

- How can we use information about the factors to determine the place value of the product and the number of decimal digits in the product?
 - *Calculate the sum of decimal digits in the factors. This sum represents the number of decimal digits in the product.*

Exit Ticket (5 minutes)

Name _____

Date _____

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Exit Ticket

Use estimation or fraction multiplication to determine if your answer is reasonable.

1. Calculate the product: 78.93×32.45 .
2. Paint costs \$29.95 per gallon. Nikki needs 12.25 gallons to complete a painting project. How much will Nikki spend on paint? Remember to round to the nearest penny.

Exit Ticket Sample Solutions

1. Calculate the product: 78.93×32.45 .

2,561.2785

2. Paint costs \$29.95 per gallon. Nikki needs 12.25 gallons to complete a painting project. How much will Nikki spend on paint? Remember to round to the nearest penny.

Nikki would spend \$366.89 on paint to complete her project.

Problem Set Sample Solutions

Solve each problem. Remember to round to the nearest penny when necessary.

1. Calculate the product: 45.67×32.58 .

1,487.9286

2. Deprina buys a large cup of coffee for \$4.70 on her way to work every day. If there are 24 work days in the month, how much does Deprina spend on coffee throughout the entire month?

$$4.70 \times 24 = 112.80$$

Deprina would spend \$112.80 a month on coffee.

3. Krego earns \$2,456.75 every month. He also earns an extra \$4.75 every time he sells a new gym membership. Last month, Krego sold 32 new gym memberships. How much money did Krego earn last month?

$$2,456.75 + (4.75 \times 32) = 2,608.75$$

Krego earned \$2,608.75 last month.

4. Kendra just bought a new house and needs to buy new sod for her backyard. If the dimensions of her yard are 24.6 feet by 14.8 feet, what is the area of her yard?

$$24.6 \times 14.8 = 364.08$$

The area of Kendra's yard is 364.08 square feet.