Using Fractions to Multiply Decimals

Let's look at products that are decimals.

5.1 Multiplying by 10

1. In which equation is the value of x the largest? Explain your reasoning.

   $x \cdot 10 = 810$

   $x \cdot 10 = 81$

   $x \cdot 10 = 8.1$

   $x \cdot 10 = 0.81$

2. How many times the size of 0.81 is 810?

5.2 Fractionally Speaking: Powers of Ten

Work with a partner. One partner finds the values of the expressions labeled “Partner A” and the other does the same for the expressions labeled “Partner B.” Then compare your results.

1. Find each product or quotient. Be prepared to explain your reasoning.

   Partner A

   a. $250 \cdot \frac{1}{10}$

   b. $250 \cdot \frac{1}{100}$

   c. $48 \div 10$

   d. $48 \div 100$

   Partner B

   a. $250 \div 10$

   b. $250 \div 100$

   c. $48 \cdot \frac{1}{10}$

   d. $48 \cdot \frac{1}{100}$

2. Use your work in the previous problems to find $720 \cdot (0.1)$ and $720 \cdot (0.01)$. Explain your reasoning.

   Pause here for a class discussion.

3. Find each product. Show your reasoning.

   a. $36 \cdot (0.1)$

   b. $(24.5) \cdot (0.1)$

   c. $(1.8) \cdot (0.1)$

   d. $54 \cdot (0.01)$

   e. $(9.2) \cdot (0.01)$

5.3 Fractionally Speaking: Multiples of Powers of Ten

1. Select **all** expressions that are equivalent to $(0.6) \cdot (0.5)$. Be prepared to explain your reasoning.

   A. $6 \cdot (0.1) \cdot 5 \cdot (0.1)$

   B. $6 \cdot (0.01) \cdot 5 \cdot (0.1)$

   C. $6 \cdot \frac{1}{10} \cdot 5 \cdot \frac{1}{10}$

   D. $6 \cdot \frac{1}{1{,}000} \cdot 5 \cdot \frac{1}{100}$

   E. $6 \cdot (0.001) \cdot 5 \cdot (0.01)$

   F. $6 \cdot 5 \cdot \frac{1}{10} \cdot \frac{1}{10}$

   G. $\frac{6}{10} \cdot \frac{5}{10}$

2. Find the value of $(0.6) \cdot (0.5)$. Show your reasoning.

3. Find the value of each product by writing equivalent expressions. Show your reasoning.

   a. $(0.3) \cdot (0.02)$

   b. $(0.7) \cdot (0.05)$

Are you ready for more?

Ancient Romans used letters to represent numbers, as shown in the table.

1.

Roman numeral	number
I	1
V	5
X	10
L	50
C	100
D	500
M	1,000

Other numbers were written by combining the letters. For example:

- III is 3.
- IV is 4.
- VI is 6.
- IX is 9.
- LXXVIII is 78.

Can you explain why each combination of letters represents each number?

2. Write each number in Roman numerals:
   a. 15
   b. 40
   c. 53
   d. 54
   e. 167
3. Write this year in Roman numerals.
4. How might ancient Romans represent the values of $12 \cdot 3$, $12 \cdot 30$, and $12 \cdot 300$?

Lesson 5 Summary

We can use fractions like $\frac{1}{10}$ and $\frac{1}{100}$ to reason about the location of the decimal point in a product of two decimals.

Let's take $24 \cdot (0.1)$ as an example. There are several ways to find the product:

- We can interpret it as 24 groups of 1 tenth (or 24 tenths), which is 2.4.
- We can think of it as $24 \cdot \frac{1}{10}$, which is equal to $\frac{24}{10}$ (and also equal to 2.4).
- Because multiplying by $\frac{1}{10}$ has the same result as dividing by 10, we can also think of it as $24 \div 10$, which is equal to 2.4.

Similarly, we can think of $(0.7) \cdot (0.09)$ as 7 tenths times 9 hundredths, and write:

$$\left(7 \cdot \frac{1}{10}\right) \cdot \left(9 \cdot \frac{1}{100}\right)$$

We can rearrange the whole numbers and fractions:

$$(7 \cdot 9) \cdot \left(\frac{1}{10} \cdot \frac{1}{100}\right)$$

This tells us that $(0.7) \cdot (0.09) = 0.063$.

$$63 \cdot \frac{1}{1{,}000} = \frac{63}{1{,}000}$$

Here is another example: To find $(1.5) \cdot (0.43)$, we can think of 1.5 as 15 tenths and 0.43 as 43 hundredths. We can write the tenths and hundredths as fractions and rearrange the factors.

$$\left(15 \cdot \frac{1}{10}\right) \cdot \left(43 \cdot \frac{1}{100}\right) = 15 \cdot 43 \cdot \frac{1}{1{,}000}$$

Multiplying 15 and 43 gives us 645, and multiplying $\frac{1}{10}$ and $\frac{1}{100}$ gives us $\frac{1}{1{,}000}$. So $(1.5) \cdot (0.43)$ is $645 \cdot \frac{1}{1{,}000}$, which is 0.645.