

Unit 3 Lesson 16: Methods for Multiplying Decimals

1 Multiplying by 10 (Warm up)

Student Task Statement

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

$$x \cdot 10 = 810$$

$$x \cdot 10 = 81$$

$$x \cdot 10 = 8.1$$

$$x \cdot 10 = 0.81$$

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

2 Fractionally Speaking: Multiples of Powers of Ten

Student Task Statement

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 and reasoning with an equivalent expression with fractions.

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

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

3 Using Properties to Reason about Multiplication

Student Task Statement

Elena and Noah used different methods to compute $(2.4) \cdot (1.3)$. Both calculations were correct.

$$(2.4) \cdot 10 = 24$$

$$(1.3) \cdot 10 = 13$$

$$24 \cdot 13 = 312$$

$$312 \div 100 = 3.12$$

Elena's Method

$$2.4 = \frac{24}{10}$$

$$1.3 = \frac{13}{10}$$

$$\frac{24}{10} \cdot \frac{13}{10} = \frac{312}{100}$$

$$\frac{312}{100} = 3.12$$

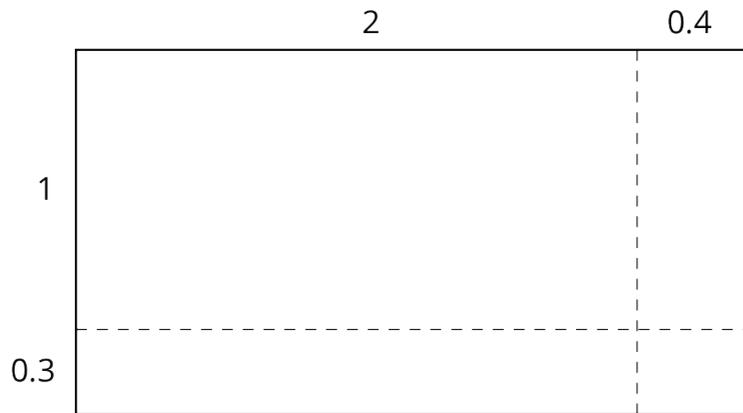
Noah's Method

1. Analyze the two methods, then discuss these questions with your partner.
 - Which method makes more sense to you? Why?
 - What might Elena do to compute $(0.16) \cdot (0.03)$? What might Noah do to compute $(0.16) \cdot (0.03)$? Will the two methods result in the same value?
2. Compute each product using the equation $21 \cdot 47 = 987$ and what you know about fractions, decimals, and place value. Explain or show your reasoning.
 - a. $(2.1) \cdot (4.7)$
 - b. $21 \cdot (0.047)$
 - c. $(0.021) \cdot (4.7)$

4 Connecting Area Diagrams to Calculations with Decimals

Student Task Statement

1. You can use area diagrams to represent products of decimals. Here is an area diagram that represents $(2.4) \cdot (1.3)$.



- Find the region that represents $(0.4) \cdot (0.3)$. Label it with its area of 0.12.
- Label the other regions with their areas.
- Find the value of $(2.4) \cdot (1.3)$. Show your reasoning.

2. Here are two ways of calculating $(2.4) \cdot (1.3)$.

$$\begin{array}{r}
 2.4 \\
 \times 1.3 \\
 \hline
 0.12 \\
 0.6 \\
 0.4 \\
 + 2 \\
 \hline
 3.12
 \end{array}
 \left. \vphantom{\begin{array}{r} 2.4 \\ \times 1.3 \\ \hline 0.12 \\ 0.6 \\ 0.4 \\ + 2 \\ \hline 3.12 \end{array}} \right\} \text{partial products}$$

Calculation A

$$\begin{array}{r}
 2.4 \\
 \times 1.3 \\
 \hline
 0.72 \\
 + 2.4 \\
 \hline
 3.12
 \end{array}$$

Calculation B

Analyze the calculations and discuss these questions with a partner:

- In Calculation A, where does the 0.12 and other partial products come from?

- In Calculation B, where do the 0.72 and 2.4 come from?
- In each calculation, why are the numbers below the horizontal line aligned vertically the way they are?

3. Find the product of $(3.1) \cdot (1.5)$ by drawing and labeling an area diagram. Show your reasoning.
4. Show how to calculate $(3.1) \cdot (1.5)$ using numbers without a diagram. Be prepared to explain your reasoning. If you are stuck, use the examples in a previous question to help you.

Activity Synthesis

$$\begin{array}{r}
 2.4 \\
 \times 1.3 \\
 \hline
 0.12 \\
 0.6 \\
 0.4 \\
 + 2 \\
 \hline
 3.12
 \end{array}$$

$$\begin{array}{r}
 24 \\
 \times 13 \\
 \hline
 12 \\
 60 \\
 40 \\
 + 200 \\
 \hline
 312
 \end{array}$$