## Lesson 6: Methods for Multiplying Decimals

### 6.1: Equivalent Expressions

Write as many expressions as you can think of that are equal to 0.6. Do not use addition or subtraction.

### 6.2: Using Properties of Numbers to Reason about Multiplication

Elena and Noah used different methods to compute $(0.23)⋅(1.5)$. Both calculations were correct.



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 $(0.16)⋅(0.03)$? What might Noah do to compute $(0.16)⋅(0.03)$? Will the two methods result in the same value?
2. Compute each product using the equation $21⋅47=987$ and what you know about fractions, decimals, and place value. Explain or show your reasoning.
	1. $(2.1)⋅(4.7)$
	2. $21⋅(0.047)$
	3. $(0.021)⋅(4.7)$

### 6.3: Using Area Diagrams to Reason about Multiplication

1. In the diagram, the side length of each square is 0.1 unit.
	1. Explain why the area of each square is *not* 0.1 square unit.
	* 
	1. How can you use the area of each square to find the area of the rectangle? Explain or show your reasoning.
	2. Explain how the diagram shows that the equation $(0.4)⋅(0.2)=0.08$ is true.
2. Label the squares with their side lengths so the area of this rectangle represents $40⋅20$.
	1. What is the area of each square?
	2. Use the squares to help you find $40⋅20$. Explain or show your reasoning.
* 
1. Label the squares with their side lengths so the area of this rectangle represents $(0.04)⋅(0.02)$.
* Next, use the diagram to help you find $(0.04)⋅(0.02)$. Explain or show your reasoning.
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### Lesson 6 Summary

Here are three other ways to calculate a product of two decimals such as $(0.04)⋅(0.07)$.

* First, we can multiply each decimal by the same power of 10 to obtain whole-number factors.
* Because we multiplied both 0.04 and 0.07 by 100 to get 4 and 7, the product 28 is $(100⋅100)$ times the original product, so we need to divide 28 by 10,000.
* $(0.04)⋅100=4$
* $(0.07)⋅100=7$
* $4⋅7=28$
* $28÷10,​000=0.0028$
* Second, we can write each decimal as a fraction, $0.04=\frac{4}{100}$ and $0.07=\frac{7}{100}$, and multiply them. $\frac{4}{100}⋅\frac{7}{100}=\frac{28}{10,​000}=0.0028$
* Third, we can use an area model. The product $(0.04)⋅(0.07)$ can be thought of as the area of a rectangle with side lengths of 0.04 unit and 0.07 unit.
* 
* In this diagram, each small square is 0.01 unit by 0.01 unit. The area of each square, in square units, is therefore $\left(\frac{1}{100}⋅\frac{1}{100}\right)$, which is $\frac{1}{10,000}$.
* Because the rectangle is composed of 28 small squares, the area of the rectangle, in square units, must be: $28⋅\frac{1}{10,000}=\frac{28}{10,000}=0.0028$

All three calculations show that $(0.04)⋅(0.07)=0.0028$.



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