Unit 7 Lesson 2: Multiplying Powers of Ten

1 100, 1, or $\frac{1}{100}$? (Warm up)

Student Task Statement
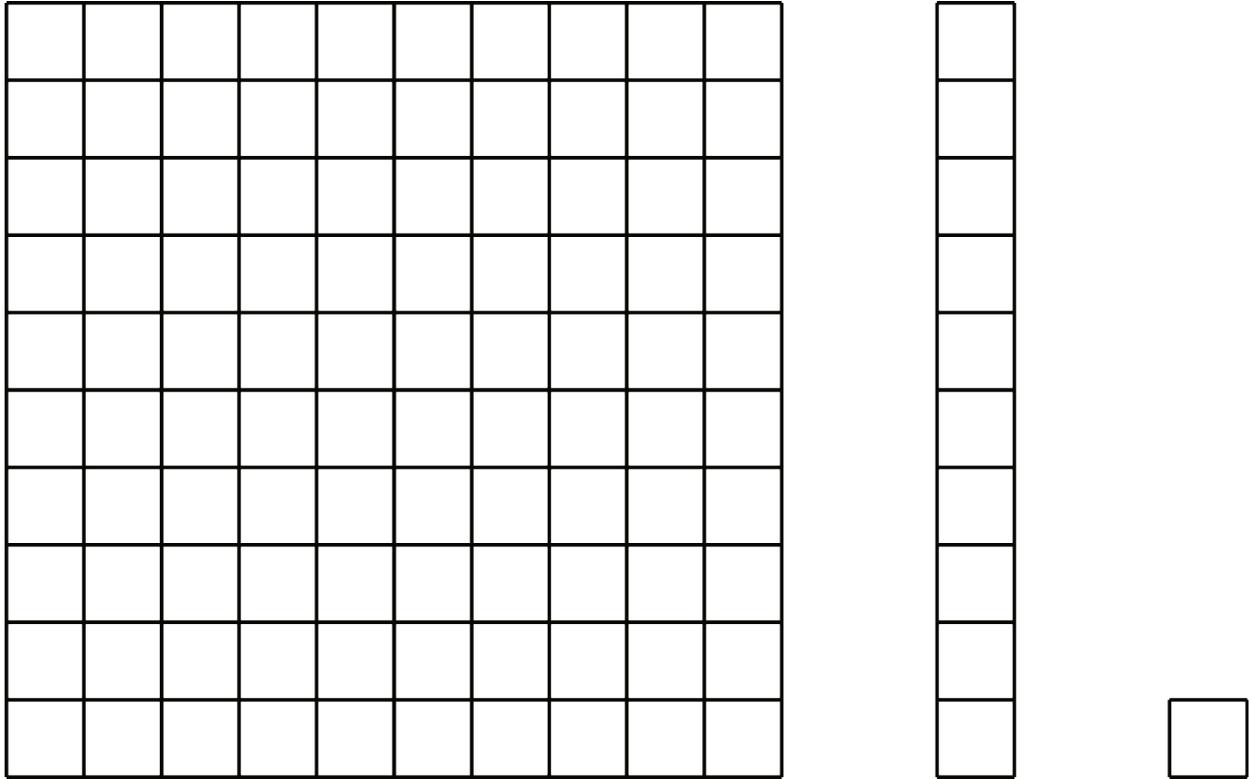

Clare said she sees 100.

Tyler says he sees 1.

Mai says she sees $\frac{1}{100}$.

Who do you agree with?

2 Picture a Power of 10

Student Task Statement

In the diagram, the medium rectangle is made up of 10 small squares. The large square is made up of 10 medium rectangles.

1. How could you represent the large square as a power of 10?

2. If each small square represents 10^2, then what does the medium rectangle represent? The large square?

3. If the medium rectangle represents 10^5, then what does the large square represent? The small square?

4. If the large square represents 10^{100}, then what does the medium rectangle represent? The small square?

3 Multiplying Powers of Ten

Student Task Statement

1. a. Complete the table to explore patterns in the exponents when multiplying powers of 10. You may skip a single box in the table, but if you do, be prepared to explain why you skipped it.

expression	expanded	single power of 10
$10^2 \cdot 10^3$	$(10 \cdot 10)(10 \cdot 10 \cdot 10)$	10^5
$10^4 \cdot 10^3$		
$10^4 \cdot 10^4$		
	$(10 \cdot 10 \cdot 10)(10 \cdot 10 \cdot 10 \cdot 10 \cdot 10)$	
$10^{18} \cdot 10^{23}$		

   b. If you chose to skip one entry in the table, which entry did you skip? Why?

2. a. Use the patterns you found in the table to rewrite $10^n \cdot 10^m$ as an equivalent expression with a single exponent, like $10^{\square}$.

   b. Use your rule to write $10^4 \cdot 10^0$ with a single exponent. What does this tell you about the value of 10^0?

3. The state of Georgia has roughly 10^7 human residents. Each human has roughly 10^{13} bacteria cells in his or her digestive tract. How many bacteria cells are there in the digestive tracts of all the humans in Georgia?

Activity Synthesis

Rule	Example for Why it Works
$10^n \cdot 10^m = 10^{n+m}$	$10^2 \cdot 10^3 = (10 \cdot 10) \cdot (10 \cdot 10 \cdot 10) = 10^5$

$10^2 \cdot 10^3 = (10 \cdot 10) \cdot (10 \cdot 10 \cdot 10) = 10^5$

two factors that are ten $+$ three factors that are ten $=$ five factors that are ten