

### Taking Powers of Powers

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

Expression	Expanded Form	Single Power
$(10^3)^2$	$(10 \cdot 10 \cdot 10)(10 \cdot 10 \cdot 10)$	$10^6$
$(5^2)^5$	$(5 \cdot 5)(5 \cdot 5)(5 \cdot 5)(5 \cdot 5)(5 \cdot 5)$	$5^{10}$
$(x^3)^4$	$(x \cdot x \cdot x)(x \cdot x \cdot x)(x \cdot x \cdot x)(x \cdot x \cdot x)$	$x^{12}$
$(9^4)^2$	$(9 \cdot 9 \cdot 9 \cdot 9)(9 \cdot 9 \cdot 9 \cdot 9)$	$9^8$
$(7^8)^{11}$	Skip	$7^{88}$

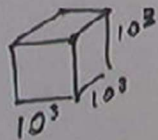
- If you chose to skip one entry in the table, which entry did you skip? Why?

Too long

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

Multiply exponents  $\rightarrow 10^{m \cdot n}$

- If you took the amount of oil consumed in 2 months in 2013 worldwide, you could make a cube of oil that measures  $10^3$  meters on each side. How many cubic meters of oil is this? Do you think this would be enough to fill a pond, a lake, or an ocean?



Volume:  $L \cdot W \cdot H$

$$10^3 \cdot 10^3 \cdot 10^3$$

$$(10^3)^3$$

$$10^9$$