Power of a Power Property Exponents
Lesson 25

To solve an equation with more than one exponent associated with only ONE BASE, such as $(5^4)^3$, we can use the exponent on the **outside** of the **brackets** to tell us how many times to write the expression **inside** the **brackets**.

$$(5^4)^3 = 5^4 \times 5^4 \times 5^4 = 5^{4+4+4} = \boxed{5^{12}}$$

But, if we use the **power of a power property**, we can exponentially solve the above question by multiplying.

EXAMPLES:

1.) $(12^4)^5 = 12^{4 \times 5} = \boxed{12^{20}}$

2.) $[(8^{-3})^7]^2 = 8^{-3 \times 7 \times 2} = \boxed{8^{-42}}$

3.) $(5^2 \cdot 6^3)^4 = 5^{2 \times 4} \times 6^{3 \times 4} = \boxed{5^8 \times 6^{12}}$

4.) $(3^4 a^2 b^3)^5 = 3^{4 \times 5} \cdot a^{2 \times 5} \cdot b^{3 \times 5} = \boxed{3^{20} a^{10} b^{15}}$