

Laws of Exponents

- Zero as an exponent:
 - **A number to the exponent of 0 is always 1**
 - Examples: $(-5.9)^0 = 1$ $123^0 = 1$ $x^0 = 1$
- Negative Exponents
 - Negative exponent on top of fraction, bring it to the bottom and make it positive
 - Negative exponent on the bottom, bring it to the top and make it positive
 - Examples: $x^2y^{-3}z = \frac{x^2z}{y^3}$ $\frac{x^3y^3}{z^{-3}} = x^3y^3z^3$

More laws

- Multiplication rule
 - **When Multiplying 2 Numbers with the Same Bases, Keep the Base and Add the Exponent**
 - Example: $x^7 \cdot x^4 = x^{7+4} = x^{11}$
- Division Rule
 - **When Divide 2 Numbers with the Same Base, Subtract the Exponents**
 - Example: $\frac{x^7}{x^4} = x^{7-4} = x^3$
- Power to a Power
 - **When you have a Power to a Power, Multiply the Exponents**
 - Example: $(x^4)^7 = x^{4(7)} = x^{28}$

Ex. 1) Which equation correctly shows that

• $(x^5)^2 = x^{10}$

A.) $(x^5)^2 = (x^5)(x^2) = x^{10}$

B.) $(x^5)^2 = (x^5)(x^5) = x \cdot x \cdot x \cdot x \cdot x \cdot x \cdot x \cdot x \cdot x \cdot x = x^{10}$

C.) $(x^5)^2 = 2(5x) = 10x = x^{10}$

D.) $(x^5)^2 = 2x^5 = x^5 + x^5 = x^{10}$

$(x^5)^2 \leftarrow$ means write x^5 twice.

x^5 means $x \cdot x \cdot x \cdot x \cdot x$

$(\overset{\uparrow}{x^5})(\overset{\uparrow}{x^5})$

$(x \cdot x \cdot x \cdot x \cdot x)(x \cdot x \cdot x \cdot x \cdot x)$ so, $x \cdot x \cdot x \cdot x \cdot x \cdot x \cdot x \cdot x \cdot x \cdot x$

There are 10 x , so x^{10} .

Ex. 2 Simplify the following expression

$7^2 \cdot 6^2 \leftarrow \leftarrow$ same exponent

$7 \cdot 6 = 42$ keep exponent

so

$\boxed{42^2}$