PROPERTIES OF EXPONENTS

Properties of exponents can help you simplify expressions with exponents. Review the properties in the table below.

Property	Example
Product of Powers When multiplying powers with the same base, add the exponents.	$3^2 \cdot 3^5 = 3^{(2+5)} = 3^7$
Quotient of Powers When dividing powers with the same base, subtract the exponents.	$\frac{9^7}{9^4} = 9^{(7-4)} = 9^3$
Power of a Power To find a power of a power, multiply the exponents.	$(4^6)^2 = 4^{(6 \cdot 2)} = 4^{12}$
Zero Exponent Any nonzero base raised to the zero power equals 1.	$15^0 = 1$
Negative Exponent If a base has a negative exponent, rewrite the expression as a fraction with 1 in the numerator and a positive exponent in the denominator.	$5^{-2} = \frac{1}{5^2}$

Practice it! Use the properties of exponents to simplify the expressions.

$6^4 \cdot 6^2 =$ ☐ $\frac{9^8}{9^3} =$ ☐ $8^{-2} =$ ☐

$10^0 =$ ☐ $3^4 \cdot 3^6 =$ ☐ $(7^2)^4 =$ ☐

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Keep going! Use the properties of exponents to simplify the expressions.

$15^{-7} =$ ☐ $12^{0} =$ ☐ $(5^{6})^{2} =$ ☐

$25^{3} \cdot 25^{2} =$ ☐ $8^{0} =$ ☐ $\frac{13^{9}}{13^{1}} =$ ☐

$(36^{3})^{2} =$ ☐ $\frac{5^{9}}{5^{2}} =$ ☐ $70^{-8} =$ ☐

Challenge! The problems below require you to use multiple properties of exponents to simplify each expression. Show each step below, and write your final answer in the box.

$3^{1} \cdot (3^{3})^{3} =$ ☐ $\frac{5^{6}}{5^{4}} \cdot 5^{3} =$ ☐ $6^{-8} \cdot 6^{8} =$ ☐

$\frac{4^{2}}{4^{5}} =$ ☐ $(9^{3})^{4} \cdot (9^{2})^{2} =$ ☐ $\frac{(8^{7})^{2}}{8^{9}} =$ ☐