Exponent Properties

What are exponents?
Exponents are when a number is multiplied by itself multiple times
For example: 2^3 or 7^4 (Pronounced as "7 to the power of 4")
The bottom number is the base and the top number is the exponent
In this case, 7 is the base and 4 is the exponent.
The exponent determines how many times the base is multiplied by itself
In this case, $7^4 = 7 \cdot 7 \cdot 7 \cdot 7 = 2401$

Exponent Properties

Property	Examples	
Product of Powers $$a^n \cdot a^m = a^{n+m}$$	$5^3 \cdot 5^4 = 5^{3+4} = 5^7$	$8^2 \cdot 8^8 = 8^{2+8} = 8^{10}$
Power of a Product $$(a \cdot b)^n = a^n \cdot b^n$$	$(4 \cdot 5)^6 = 4^6 \cdot 5^6$	$(11 \cdot 2)^3 = 11^4 \cdot 2^3$
Quotient of Powers $$\frac{a^n}{a^m} = a^{n-m}$$	$\frac{7^{24}}{7^9} = 7^{24-9} = 7^{15}$	$\frac{17^4}{17^2} = 17^{4-2} = 17^2$
Power of a Quotient $$\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n}$$	$\left(\frac{3}{4}\right)^2 = \frac{3^2}{4^2}$	$\left(\frac{19}{7}\right)^3 = \frac{19^3}{7^3}$
Power of a Power Property $$\left(a^n\right)^m = a^{n \cdot m}$$	$\left(8^4\right)^5 = 8^{4 \cdot 5} = 8^{20}$	$\left(4^3\right)^3 = 4^{3 \cdot 3} = 4^9$
Negative Exponent $$a^{-n} = \frac{1}{a^n}$$	$5^{-3} = \frac{1}{5^3}$	$6^{-2} = \frac{1}{6^2}$
Fractional Exponent $$a^{\frac{n}{m}} = \sqrt[m]{a^n}$$	$10^{\frac{2}{3}} = \sqrt[3]{10^2}$	$7^{\frac{3}{7}} = \sqrt[7]{7^3}$