Zero and Negative Exponents

Law of Exponent 1: Product of Powers

For any real numbers a and for all positive integers m and n:

$$a^m \cdot a^n = a^{m+n}$$

Law of Exponent 2: Power of a Power

For any real number a and for all positive integers m and n:

$$(a^m)^n = a^{mn}$$

Law of Exponent 3: Power of a Product

For any real numbers a and b and for any positive integer m:

$$(ab)^m = a^m b^m$$

Law of Exponent 4: Quotient of Powers

For any real number a, $a \neq 0$, and for all positive integers m and n:

$$\text{If } m > n, \text{ then } \frac{a^m}{a^n} = a^{m-n}.$$

Law of Exponent 5: Power of a Fraction

For any real numbers a and b, $b \neq 0$, and for all integer m:

$$\left(\frac{a}{b}\right)^m = \frac{a^m}{b^m}$$