

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

$$\text{ex: } 3^5 \times 3^2 = 3^{5+2} = 3^7$$

Product

$$a^m \times b^m = (a \times b)^m$$

$$\text{ex: } 3^5 \times 2^5 = (3 \times 2)^5 = 6^5$$

$$a^m \div a^n = a^{m-n}$$

$$\text{ex: } 3^7 \div 3^2 = 3^{7-2} = 3^5$$

Quotient

$$a^m \div b^m = (a \div b)^m$$

$$\text{ex: } 6^5 \div 2^5 = (6 \div 2)^5 = 3^5$$

$$\text{ex: } 5^3 \div 2^3 = \left(\frac{5}{2}\right)^3$$

Power of Power

$$(a^m)^p = a^{m \times p}$$

$$\text{ex: } (5^2)^3 = 5^{2 \times 3} = 5^6$$

Zero Exponents

$$a^0 = 1$$

$$\text{ex: } 8^0 = 1$$

Negative Exponents

$$a^{-n} = \left(\frac{1}{a}\right)^n$$

$$\text{ex: } 3^{-2} = \left(\frac{1}{3}\right)^2$$

$$\text{ex: } \left(\frac{2}{3}\right)^{-4} = \left(\frac{3}{2}\right)^4$$

Fractional Exponents

$$a^{\frac{p}{q}} = \sqrt[q]{a^p}$$

$$\text{ex: } 2^{\frac{4}{3}} = \sqrt[3]{2^4}$$