

Exponent Rules

- 1) **Product Rule** (Multiplying 'like' bases)

ADD exponents

$$5^4 \cdot 5^6 = 5^{10} \quad x^3 \cdot x^6 = x^9$$

- 2) **Quotient Rule** (Dividing 'like' bases)

SUBTRACT exponents

$$3^6 \div 3^4 = 3^2 \quad y^7 \div y^4 = y^3 \quad \frac{x^{10}}{x^3} = x^7$$

- 3) **Power Rule** (Exponent to an exponent)

MULTIPLY exponents

$$(x^4)^5 = x^{20} \quad (5^2)^3 = 5^6$$

- 4) **Fraction to an exponent** (raising a fraction or a 'quotient' to an exponent)

DISTRIBUTE exponent to numerator and denominator

$$\left(\frac{3}{4}\right)^3 = \frac{3^3}{4^3} = \frac{27}{64} \quad \left(\frac{x}{y}\right)^5 = \frac{x^5}{y^5}$$

- 5) **Product raised to an exponent** (Two or more things being multiplied in parentheses, with exponents inside and outside)

DISTRIBUTE exponent outside to every term inside following all above rules.

$$(xy)^3 = x^3 y^3 \quad (a^2 b^3 c^4)^5 = a^{10} b^{15} c^{20}$$

- 6) **Zero Exponent**: Anything to the "zero" exponent equals 1.

- 7) **Negative Exponents**: Make a fraction with the positive exponent in the denominator.

$$5^{-3} = \frac{1}{5^3} = \frac{1}{125} \quad y^{-4} = \frac{1}{y^4}$$

- 8) **Addition and Subtraction** (Like bases but different exponents)

EVALUATE each one first, separately.

$$2^2 + 2^4 = 4 + 16 = 20 \quad 3^4 - 3^2 = 81 - 9 = 72$$