

Exponent Properties

$$a^n a^m = a^{n+m} \qquad \frac{a^n}{a^m} = a^{n-m} = \frac{1}{a^{m-n}}$$

$$(a^n)^m = a^{nm} \qquad a^0 = 1, \quad a \neq 0$$

$$(ab)^n = a^n b^n \qquad \left(\frac{a}{b}\right)^n = \frac{a^n}{b^n}$$

$$a^{-n} = \frac{1}{a^n} \qquad \frac{1}{a^{-n}} = a^n$$

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

Properties of Radicals

$$\sqrt[n]{a} = a^{\frac{1}{n}} \qquad \sqrt[n]{ab} = \sqrt[n]{a} \sqrt[n]{b}$$

$$\sqrt[m]{\sqrt[n]{a}} = \sqrt[nm]{a} \qquad \sqrt[n]{\frac{a}{b}} = \frac{\sqrt[n]{a}}{\sqrt[n]{b}}$$

$$\sqrt[n]{a^n} = a, \text{ if } n \text{ is odd}$$

$$\sqrt[n]{a^n} = |a|, \text{ if } n \text{ is even}$$

Rules of Logarithms

$$\text{Rule 1: } \log_b (M \cdot N) = \log_b M + \log_b N$$

$$\text{Rule 2: } \log_b \left(\frac{M}{N}\right) = \log_b M - \log_b N$$

$$\text{Rule 3: } \log_b (M^k) = k \cdot \log_b M$$

$$\text{Rule 4: } \log_b (1) = 0$$

$$\text{Rule 5: } \log_b (b) = 1$$

$$\text{Rule 6: } \log_b (b^k) = k$$

$$\text{Rule 7: } b^{\log_b(k)} = k$$

Where : $b > 1$, and M, N and k can be any real numbers

but M and N must be positive!

More Rules: