

Exponents and Logarithms

Let a and b be real numbers and m and n be integers. Then the following properties of exponents hold, provided that all of the expressions appearing in a particular equation are defined.

$$1. a^m a^n = a^{m+n}$$

$$2. (a^m)^n = a^{mn}$$

$$3. (ab)^m = a^m b^m$$

$$4. \frac{a^m}{a^n} = a^{m-n}, a \neq 0$$

$$5. \left(\frac{a}{b}\right)^m = \frac{a^m}{b^m}, b \neq 0$$

$$6. a^{-m} = \frac{1}{a^m}, a \neq 0$$

$$7. a^{\frac{1}{n}} = \sqrt[n]{a}$$

$$8. a^0 = 1, a \neq 0$$

$$9. a^{\frac{m}{n}} = \sqrt[n]{a^m} = (\sqrt[n]{a})^m$$

$$1. \log_a xy = \log_a x + \log_a y$$

$$2. \log_a \frac{x}{y} = \log_a x - \log_a y$$

$$3. \log_a x^y = y \cdot \log_a x$$

$$4. \log_a a^x = x$$

$$5. a^{\log_a x} = x$$