

Chapter 6: Exponential & Logarithmic Functions.

① Exponential & logarithmic forms

$y = a^x$ is equivalent to $x = \log_a y$, where $a > 0, a \neq 1$

Diagram showing the relationship between the exponential form $y = a^x$ and the logarithmic form $x = \log_a y$. The base a is labeled as the "base" and the exponent x is labeled as the "index".

② Laws of indices & logarithms.

Laws of Indices

Law 1: $a^m \times a^n = a^{m+n}$

Law 2: $\frac{a^m}{a^n} = a^{m-n}$

Law 3: $(a^m)^n = a^{m \times n}$

Law 4: $a^n \times b^n = (ab)^n$

Law 5: $\frac{a^n}{b^n} = \left(\frac{a}{b}\right)^n$

Laws of Logarithms

$\log_a x + \log_a y = \log_a xy$ (Product rule)

$\log_a x - \log_a y = \log_a \frac{x}{y}$ (Quotient rule)

$\log_a x^r = r \log_a x$ (Power rule)

③ Change of Base formula.

$$\log_a b = \frac{\log_c b}{\log_c a}$$

Special case: $\log_a b = \frac{1}{\log_b a}$

④ Special Properties of logarithms.

#1 $\log_a 1 = 0$

Special case: $\lg 1 = 0, \ln 1 = 0$

#2 $\log_a a = 1$

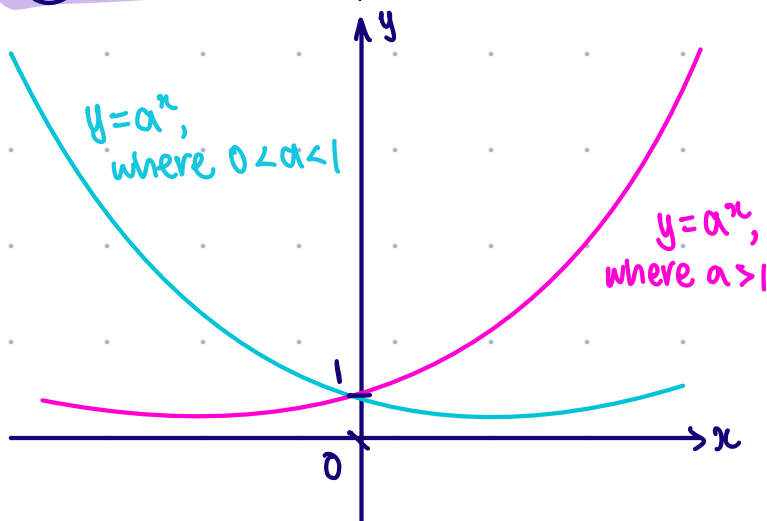
Special case: $\lg 10 = 1, \ln e = 1$

#3 $a^{\log_a b} = b$

Equality of log

$\log_a p = \log_a q$
 $\therefore p = q$

⑤ Exponential Graphs



⑥ Logarithmic graphs

