Formelsammlung Logarithmen – Mittelstufe

Definition	
$a^x = b \iff x = \log_a(b)$ mit $a, b > 0$	$2^x = 64 \Rightarrow x = \log_2(64) = 6$
$\log_a(a^x) = x$	$\lg(10^5) = 5$
$a^{\log_a(x)} = x$	$10^{\lg(5)} = 5$

Spezielle Basen	
dekadisch: $\lg(x) := \log_{10}(x)$	$\lg(100) = 2$
natürlich: $\ln(x) := \log_e(x)$	$\ln(e^{-3}) = -3$

Basenwechsel	
$\log_a(x) = \dfrac{\ln(x)}{\ln(a)} = \dfrac{\lg(x)}{\lg(a)}$	$\log_2(32) = \frac{\lg(32)}{\lg(2)}$

Logarithmengesetze	
$\log_a(x \cdot y) = \log_a(x) + \log_a(y)$	$\log_a(3 \cdot x) = \log_a(3) + \log_a(x)$
$\log_a(\frac{x}{y}) = \log_a(x) - \log_a(y)$	$\log_a(\frac{3}{x}) = \log_a(3) - \log_a(x)$
$\log_a(\frac{1}{x}) = -\log_a(x)$	$\log_a(\frac{1}{10}) = -\log_a(10)$
$\log_a(x^m) = m \cdot \log_a(x)$	$\log_a(x^3) = 3\log_a(x)$

Spezielle Werte	
$\log_a(a) = 1$	$\lg(10) = \log_2(2) = \log_3(3) = 1$
$\log_a(1) = 0$	$\lg(1) = \log_2(1) = \log_3(1) = 0$