Logarithms

Logarithm of y with base b.

$\log_b y = x$ Read as "log base b of y."

$\log_2 8 = 3$ What power of 2 equals 8?

$2^3 = 8$

$\log_4 1 = 0$ What power of 4 equals 1?

$4^? = 1$ $4^0 = 1$

$\log_4 1/4 = -1$ What power of 4 equals 1/4 ?

$4^? = \frac{1}{4}$ $4^{-1} = \frac{1}{4}$

$\log_3 81 = 4$ What power of 3 equals 81?

$3^? = 81$ $3^4 = 81$

Why we need logs:

$3^? = 3$

$3^? = 7$

$3^2 = 9$

$\log_b y = x$ ("answer", exponent, base)

$b^x = y$

Rewrite the equation in exponential form.

a. $\log_2 32 = 5$ $2^5 = 32$

b. $\log_{10} 1 = 0$ $10^0 = 1$

c. $\log_9 9 = 1$ $9^1 = 9$

d. $\log_{1/5} 25 = -2$ $\left(\frac{1}{5}\right)^{-2} = 25$

Evaluate the logarithm.

a. $\log_3 81 = 4$ $3^? = 81$ $3^4 = 81$

b. $\log_4 256 = 4$ $4^? = 256$ $4^4 = 256$

c. $\log_{10} 1000 = 3$ $10^? = 1000$ $10^3 = 1000$

d. $\log_{64} 2 = \frac{1}{6}$ $64^? = 2 \rightarrow$ $64 = 2^6$

e. $\log_9 (1/3) = -\frac{1}{2}$ $\sqrt[4]{64} = 2$

$9^? = \frac{1}{3}$ $64^{\frac{1}{6}} = 2$

$\sqrt{9} = 3$

$9^{\frac{1}{2}} = 3$

$9^{-\frac{1}{2}} = \frac{1}{3}$