

6.2 Logarithmic Functions

Write the inverse of $y = 4^x$

$3 = 4^x$

$X = 4^y \rightarrow Y = \log_4 X$

any exponential can be written in logarithmic form

$$a = b^x \Leftrightarrow x = \log_b a$$

↑
base
↑
base
↑
base

"log of base b"

6.2 Logarithmic Functions

Rewrite each equation in logarithmic form.

a) $16 = 2^4$

$4 = \log_2 16$

"What exponent on 2 is 16?"

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

$-2 = \log_3 \left(\frac{1}{9}\right)$

6.2 Logarithmic Functions

Evaluate.

a) $\log_3 81 = 4$

"What exponent on 3 is 81?"

$3^x = 81$

$x = 4$

c) $\log_{10} 0.01$

$= -2$

$\log_{10} 10^{-2}$

$= -2$

b) $\log_2 \left(\frac{1}{8}\right)$

$= \log_2 \left(\frac{1}{2^3}\right)$

$= \log_2 (2^{-3})$

$= -3$

6.2 Logarithmic Functions

Rewrite in exponential form.

a) $\log_4 64 = 3$

$4^3 = 64 \checkmark$

b) $y = \log_b x$

$x = b^y$

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Evaluate, correct to two decimal places, using a calculator.

$$\begin{array}{ll} \log 0.2 = \log_{10}(0.2) & \log 183 \\ = -0.6989 & \approx 2.2625 \end{array}$$