Questions from Homework

Logarithms

exponential form

$$x = b^y$$

Say "the base **b** to the exponent **y** is **x**."

logarithmic form

exp. $\longrightarrow$ $y = \log_b x$ $\longleftarrow$ answer

base

Say "**y** is the exponent to which you raise base **b** to get the answer **x**."

Example 1

Write each of the following in logarithmic form

a) $32 = 2^5$

b) $2^{-5} = \dfrac{1}{32}$

c) $x = 10^y$

Solutions   Compare $x = b^y \longleftrightarrow y = \log_b x$

a) $32 = 2^5 \; \bullet\!\!\longrightarrow \; 5 = \log_2 32$

exp   base   answer

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b) $2^{-5} = \dfrac{1}{32} \; \bullet\!\!\longrightarrow \; -5 = \log_2\left(\dfrac{1}{32}\right)$

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c) $x = 10^y \; \bullet\!\!\longrightarrow \; y = \log_{10} x$

$y = \log x$ "common logarithm"

base = 10

When writing logarithms or evaluating expressions involving logarithms, you will find it useful to bear in mind the equivalent exponential form.

$$x = b^y \longleftrightarrow y = \log_b x$$

exp. base ans.

Example 2

Evaluate each of the following.

a) $\log_{10} 100$ b) $\log_2 64$ c) $\log_5 \sqrt{5}$

Solutions

a) $\log_{10} 100 \longleftarrow$ Think: to what exponent is
the base 10 raised to obtain 100?

$x = b^y$

$100 = 10^y$ $\leftarrow$ when solving for an exponent
find a common base

$10^2 = 10^y$

$2 = y$

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b) $\log_2 64$ ✳ $\dfrac{\log 64}{\log 2} = 6$ or $\dfrac{\ln 6}{\ln 2} = 6$

$2^y = 64$

✳ $2^y = 2^6$

$y = 6$

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c) $\log_5 \sqrt{5}$

$5^y = \sqrt{5}$

$5^y = 5^{1/2}$

$y = \dfrac{1}{2}$

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Homework