7.4 Logarithms and Logarithmic Function

<u>logarithm</u> is the inverse of a power

eg. 10^x inverse is log to base 10 of x

$\log_{10} x$

"log base 10 of x"

<u>logarithm</u> – is an exponent

– $\log_b c$ is the power to which b is raised to get c

– base of log is the same as base of the power

value

$$* \quad \boxed{\log_b c = a \longrightarrow c = b^a}$$

base exp.

$b, c > 0$

$b \neq 1$

ex. 1 Write as a log.

a) $3^4 = 81$ $\qquad 4 = \log_3 81$

b) $5^{-2} = \frac{1}{25}$ $\qquad -2 = \log_5\left(\frac{1}{25}\right)$

2. write as an exponent

a) $\log_7 49 = 2$ $\qquad 7^{\boxed{2}} = \boxed{49}$

b) $\log_4\left(\frac{1}{64}\right) = -3$ $\qquad 4^{-3} = \frac{1}{64}$

Common log uses powers of 10

$\Longrightarrow \log_{10} x$ OR $\log x$

$$\log_b b^{n} = n$$

eg. $\log_2 2^{3} = 3$

ex 3 evaluating logs

a) $\log_5 3125$ $\qquad$ option $\rightarrow$ change to a power

$\boxed{x}$

a) $\log_5 3125$ option → change to

$$5^{\boxed{x}} = 3125$$

$$5^x = 5^5$$

$$\boxed{x = 5}$$

option → $\log_5 5^5 = 5$

b) $\log_6\left(\frac{1}{216}\right)$

$$6^x = \frac{1}{216}$$

$$6^x = \frac{1}{6^3}$$

$$6^x = 6^{-3}$$

$$\boxed{x = -3}$$

ex.4 estimate $\log_2 10$

$$2^x = 10$$

benchmarks → $2^3 = 8$ $\quad 2^4 = 16$

x is between 3 + 4 but closer to 3

estimate $x = 3.2$ or 3.3

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