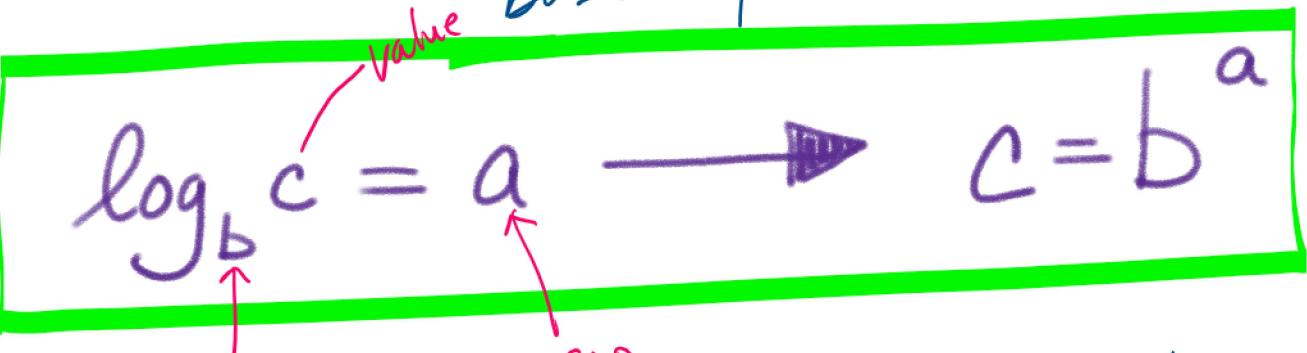


## 7.4 Logarithms and Logarithmic Function

logarithm is the inverse of a power  
 eg.  $10^x$  inverse is log to base 10 of  $x$   
 $\log_{10} x$   
 "log base 10 of  $x$ "

- 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

\* 

$$\log_b c = a \longrightarrow c = b^a$$

$b, c > 0$   
 $b \neq 1$

ex. 1 Write as a log.

a)  $3^4 = 81$

$$4 = \log_3 81$$

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

2. write as an exponent

a)  $\log_7 49 = 2$

$$7^{\boxed{2}} = \boxed{49}$$

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

$$4^{-3} = \frac{1}{64}$$

Common log uses powers of 10

$$\Rightarrow \log_{10} x \text{ OR } \log x$$

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

e.g.  $\log_2 2^{\circled{3}} = 3$

ex 3 evaluating logs

a)  $\log_5 3125$  option  $\rightarrow$  change to a power  
-  $\boxed{x}$  ...

a)  $\log_5 5125$

option - "unargue"

$$5^{\boxed{x}} = 5125$$
$$5^x = 5^5$$

$$\boxed{x = 5}$$

option  $\rightarrow \log_5 5^5 = 5$

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  $\rightarrow 2^3 = 8$

$$2^4 = 16$$

$x$  is between 3 + 4 but closer to 3

estimate  $x = 3.2$  or  $3.3$

P 431 # 4-9, 13