

Exponential + Logarithmic Functions

Objective : To

- 1) simplify
- 2) solve exponential equations
- 3) evaluate logarithmic expressions
- 4) solve logarithmic equations and inequalities.

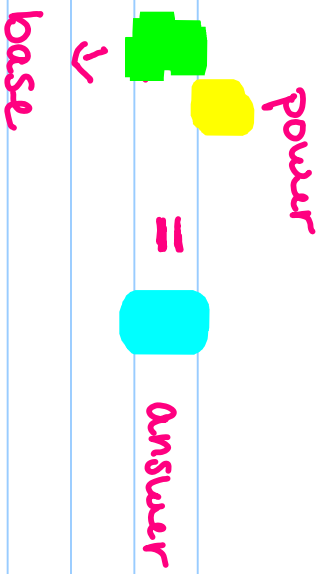
Ex 1 : Simplify

a) $5^{\sqrt{3}} \div 5^{\sqrt{3}}$

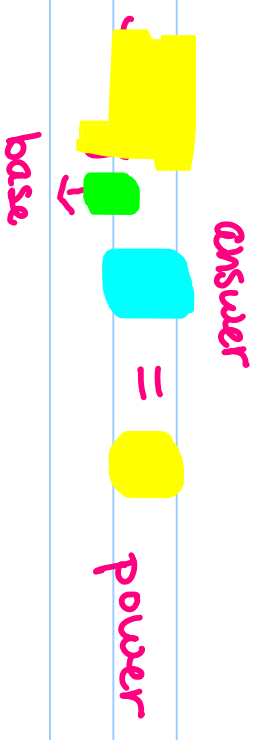
b) $(6^{\sqrt{3}})^{\sqrt{3}}$

c) $2^{\sqrt{3}} \cdot 2^{\sqrt{3}}$

d) $64^{\sqrt{3}} \cdot 2^{\sqrt{3}}$



exponential form



logarithmic form

$$a) 5^3 = 125$$

$$b) \log_5 125 = 3$$

$$\log_5 125 = 3$$

$$3^2 = 9$$

Log Laws

$$X^a \cdot X^b = X^{a+b}$$

$$X^{y+z} = X^y \cdot X^z$$

$$1) \log_b x \oplus \log_b y = \log_b \boxed{xy}$$

$$(X^a)^b$$

$$2) \log_b x \ominus \log_b y = \log_b \boxed{\frac{x}{y}}$$

$$*3) p \cdot \log_b x = \log_b x^p$$

$$4) \text{IF } \log_b \boxed{x} = \log_b \boxed{y}, \text{ then } x = y. \quad \underline{\text{Solve}}$$

Evaluate \rightarrow power? numerical value

$$a) \log_3 243 = P$$

$$\{P=5\}$$

Exp:

Like bases

Solve

$$3^P = 243$$

$$3^P = 3^5$$

$$b) \log_2 \frac{1}{64} = P$$

$$2^P = \frac{1}{64}$$

$$2^P = 2^{-6}$$

$$\{P=-6\}$$

$$c) \log_9 9^2 = P$$

$$9^P = 9^2$$

$$\boxed{P=2}$$

$$17) \log 7 - \boxed{2} \log 12 =$$

$$\boxed{\log \frac{7}{12^2}}$$

$$\log \frac{7}{144}$$

$$19) \sqrt[4]{\log_3 u} \cdot \sqrt[6]{\log_3 v} = \boxed{\log_3 u^{\frac{1}{6}} \cdot v^{\frac{1}{4}}}$$

$$25) \cancel{2} (\log (2x)^2 - \log y^2) - (\log 3 + \cancel{2} \log 5)$$

$$\log \frac{(2x)^2}{3 \cdot 5^2}$$

$$= \log \frac{4x^2}{75} \cdot \frac{1}{75}$$

$$= \boxed{\log \frac{4x^2}{75y^2}}$$

Expand

$$3) \log\left(\frac{4}{11}\right)^5$$

$$5 \log 4 - 5 \log 11$$

$$L3 \quad 5 \left(\log 4 - \log 11 \right)$$

$\log \square$

\rightarrow Common
log
base 10

$$11) \log \sqrt[3]{x \cdot y \cdot z}$$

$$\log (x \cdot y \cdot z)^{\frac{1}{3}}$$

$$L3 \quad \frac{1}{3} (\log x + \log y + \log z)$$

$$\text{or} \quad \frac{1}{3} \log x + \frac{1}{3} \log y + \frac{1}{3} \log z$$

Home work : Weslake - Unit 8 - logarithms.pdf
count by 4's (4, 8, ...)
• properties of logarithms.pdf
count by 4's!