

Logarithm

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Instructor, P2A

$$2^{\textcircled{3}} = \underline{8}$$

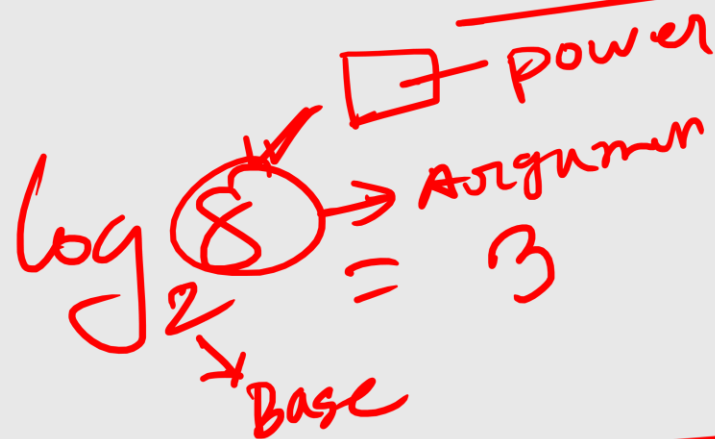
$$2 \times 2 \times 2 = 8$$

$$2^{\textcircled{3}} = 8$$

2 ki power ko 8 2 ki?

$$\log_2 8 = \underline{3}$$

$$\log_2 8 = \log_2 2^3 \Rightarrow 3 \log_2 2 = 3$$



$$8 \text{ is } 2 \text{ raised to the power } = 3$$

$$\log_a b = x \rightarrow \underline{\underline{a^x = b}}$$

$$\boxed{a > 0, \underline{\underline{a \neq 1}}}$$

$$\log_{\cancel{1}}^{\cancel{800}} = x \rightarrow \begin{matrix} \textcircled{x} \\ \downarrow \\ \textcircled{1} \end{matrix} = \textcircled{800}$$

$$\log_{\textcircled{-2}} x = \boxed{x}$$

$$\Rightarrow \textcircled{\frac{1}{2}} \textcircled{-2} = x$$

$$\checkmark \sqrt{-2}$$

$$\log_a 1 = 0 \checkmark$$

$$a^1 = a$$

$$\checkmark \log_a a = \underline{\underline{1}} \checkmark$$

$$\log_a (\underline{xy}) = \log_a x + \log_a y$$

$$\log_a \frac{x}{y} = \log_a x - \log_a y$$

$$\log_{\underline{\underline{2}}} \overset{\textcircled{3}}{a} = \log_2 \underline{a \times a \times a}$$

$$= \underline{\log_2 a} + \underline{\log_2 a} + \underline{\log_2 a}$$

$$= \underline{\textcircled{3}} \log_2 a$$

$$\log_2 8 = 3$$

$$8^{\square} = 2$$

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

$$\log_8 2 = \frac{1}{3} = \frac{1}{\log_2 8}$$

$$\log_a b = \frac{1}{\log_b a}$$

$$\frac{1}{\log_b a} = \log_a b$$

$$\log_8 2 = \frac{\log_2 2}{\log_2 8} = \frac{1}{3} \log_2 2$$

$$\log_a b = \frac{1}{x} \log_a a^x = \frac{1}{x}$$

$$\log_a b^m = \frac{m}{n} \log_a b \quad \checkmark$$

$$\log_4 256 = \underline{\underline{4}}$$

$$\log_4 256 = 4$$

$$\log_2 256 = 8$$

$$\log_{\textcircled{2}} 256 = \textcircled{8}, \quad \log_{\textcircled{4}} 256 = \underline{\underline{\textcircled{4}}}$$

$$\log_{\textcircled{2}} 256 = \log_{\textcircled{4}} 256 \times \underline{\underline{\log_{\textcircled{2}} 4}}$$

$$\log_{\text{posisi}} \sqrt{\text{Ananda}} = \log_{\text{Katherine}} \sqrt{\text{Ananda}} \times \log_{\text{Puri}} \text{kat}$$

$$\sqrt{\log_a b} = \log_m b \times \sqrt{\log_a m}$$

$$\log_a b \times \log_b c \times \log_c a = ?$$

$$\log_a c \times \log_c a = \log_a a$$

$$= 1 \checkmark$$

$$\begin{aligned}
 \log_a b &= \log_m b \times \log_a m \\
 &= \log_m b \times \frac{\log_m a}{\log_m a} \\
 &= \frac{\log_m b}{\log_m a} = \frac{\log b}{\log a}
 \end{aligned}$$

The diagram shows the derivation of the change of base formula for logarithms. It starts with the expression $\log_a b$ and shows it is equal to $\log_m b \times \log_a m$. The term $\log_a m$ is circled, and an arrow points from it to a fraction $\frac{\log_m a}{\log_m a}$. This fraction is then multiplied by $\log_m b$. Finally, the expression is simplified to $\frac{\log_m b}{\log_m a}$, which is also written as $\frac{\log b}{\log a}$.

$$\log_a b = \log_m b \times \log_a m$$

$$\log_a b = \frac{\log b}{\log a}$$

$$\log_a b \times \log_b c \times \log_c a$$

$$\frac{\log b}{\log a} \times \frac{\log c}{\log b} \times \frac{\log a}{\log c} = 1$$

\Rightarrow
 \checkmark

$$\log_{10} 100 = 2$$

$$10^x = 100$$

$\log_{10} 100 = 2$

$\log_{10} 100 = 2$

$$\log_a b = \frac{\log b}{\log a}$$

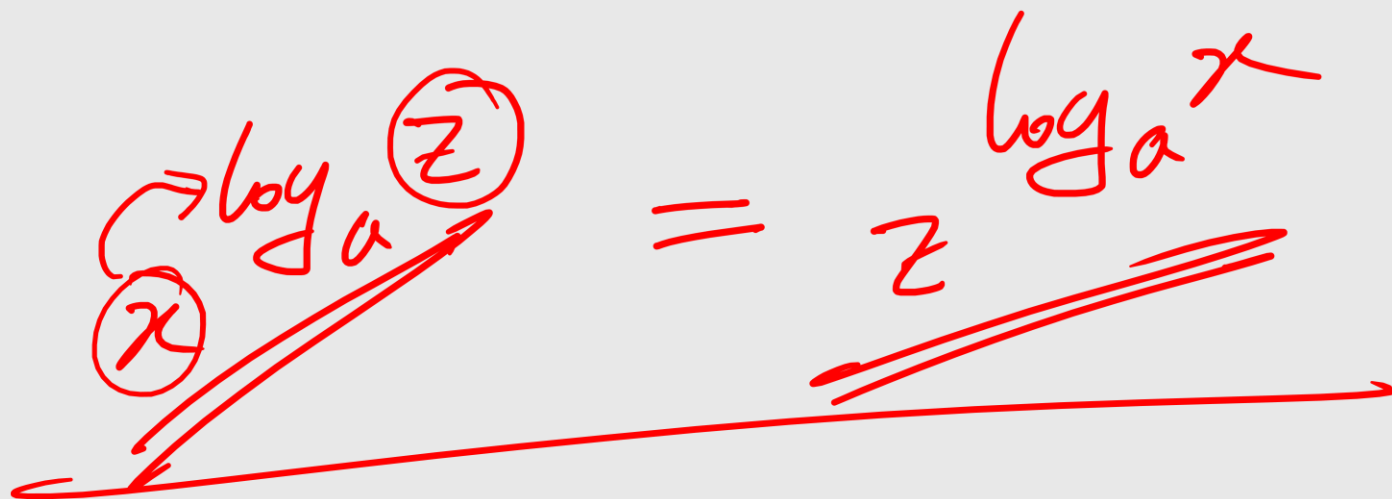


$$= 100 \log_{10}^{10}$$

$$= \underline{\underline{100}}$$

$$100 \log_{10}^{10}$$

$$a^{\log_a b} = b$$

$$\log_a^{\circlearrowleft} \log_a^{\circlearrowright} z = z^{\log_a x}$$


Formulas

- $\log_a(m \times n) = \log_a m + \log_a n$

- $\log_a\left(\frac{m}{n}\right) = \log_a m - \log_a n$

- $\log_a m^n = n \log_a m$

- $\log_a m = \log_b m \times \log_a b$

Formulas

$$\bullet \log_a m = \frac{\log m}{\log a}$$



$$\bullet a^{\log_a b} = b$$

$$\bullet \log_a a = 1$$

$$\bullet \log_a 1 = 0$$

Formulas

• $\log_a b = x$ হলে, $a^x = b$

• $x^{\log_a y} = y^{\log_a x}$

• $\log_{a^n} b^m = \frac{m}{n} \log_a b$

$\log_a 1 = 0$

$a^0 = 1$

$\log_{\sqrt{3}} 81 = ?$ [BKB (Cash)-17]

8

$\Rightarrow \log_{\sqrt{3}} 3^4$

$= \frac{4}{\frac{1}{2}} \log_3 3$

$4 \times 2 = 8$

$3^4 = 81$

$\left\{ (\sqrt{3})^2 \right\}^4 = 81$

$3^8 = 81$

$$\log_{\sqrt{2}} 16 = ? \text{ [Sonali Bank]}$$

8

$$\frac{\log 36}{\log 6} = ? \text{ [BB (Off)-18]}$$

②

$$\frac{\log 36}{\log 6}$$

$$= \frac{2 \log 6}{\log 6} = 2$$

$$\log_{10} 125 + \log_{10} 8 = ?$$

$$\log_{10} 125 \times 8$$

$$= \log_{10} 1000$$

$$= 3$$

$\log_2 8$ ~~$\log_2 8$~~ $\log_2 4$

$3 + 2 = 6$

$\log_2 8+4$ ~~$\log_2 8+4$~~

$$\log_{10} \underline{\underline{0.0001}} = ?$$

$$\log_{10} 10^{-4} = \underline{\underline{-4}}$$

youtube

$$0.0001 = \frac{1}{10000}$$
$$= \frac{1}{10^4}$$
$$= 10^{-4}$$

If $\log_x 144 = 4$, then $x = ?$ [PKB (Off)-20]

$$\log_x 144 = 4$$

$$x^4 = 144$$

$$x^4 = 12^2 = (\sqrt{12})^4$$

$$x = \sqrt{12}$$

If $\log_x \frac{9}{16} = -\frac{1}{2}$, The value of the base is x [Comb (SO-IT)-18]

$$\log_x \frac{9}{16} = -\frac{1}{2}$$

$$(x)^{-\frac{1}{2}} = \frac{9}{16}$$

$$x^{-1} = \frac{1}{x} = \frac{9}{16}$$

$$\Rightarrow x = \frac{16}{9}$$
$$x^{\frac{1}{2}} = \left(\frac{16}{9}\right)^{\frac{1}{2}} = \frac{\sqrt{16}}{\sqrt{9}} = \frac{4}{3}$$

If $\log_x \frac{1}{9} = 2$, The value of the base is [BDBL (SO)-17]

$$\log_x \frac{1}{9} = 2$$

$$x^2 = \frac{1}{9}$$

$$x = \sqrt{\frac{1}{9}} = \frac{1}{3}$$

If $\log_x 256 = 4$, then $x = ?$ [Comb (SO-FI)-18]

$$x^4 = 256$$
$$x^4 = 4^4$$
$$\underline{x = 4}$$

$$\textcircled{16} \times 16 = 256$$
$$u^{\sqrt{}} \times u^{\vee}$$
$$\textcircled{4^4}$$

If $\log_x 4 = 0.4$, then $x = ?$

x

$$0.4 = \frac{4}{10} = \frac{2}{5}$$

$$x^{0.4} = 4$$

$$\left[x \times \frac{5}{x} \right]$$

$$x^{\frac{2}{5}} = 4$$

$$x = \frac{4^5}{2} = (2^2)^{\frac{5}{2}} = 2^5 = 32$$

Thank You

