

লগারিদম

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P2A

$$4^2 = 16$$

√16 ବା ବର୍ଗ ମୂଳ କେତେ ?
√16 =

→ $4^{\square} = 16$; \square କେତେ ? Ans: 2

→ 4 ବା ମାତ୍ରା କେତେ 16, 2(0) ? ଉତ୍ତର: (2)

→ $\log_4 16 = 2$

$$\log_2 8 = ?$$

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

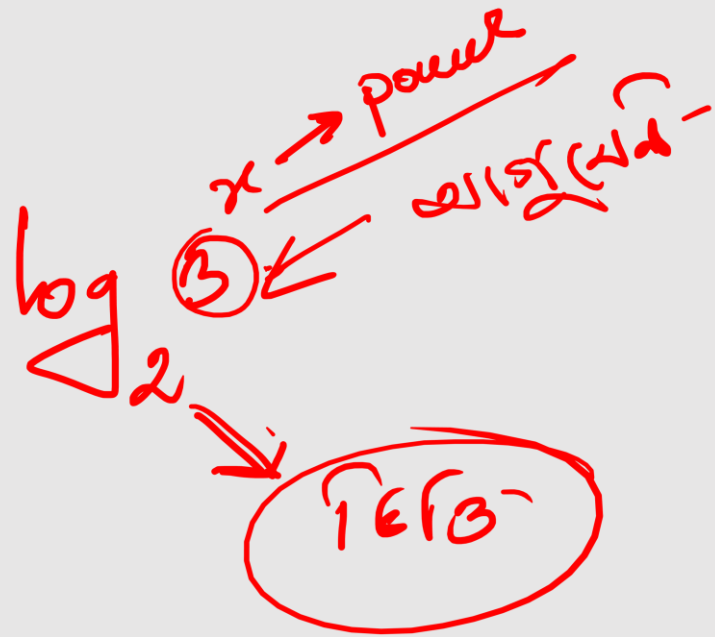
Ans: 3

$$\Rightarrow \log_4 1 =$$

Ans:

$$1^{\square} = 4$$

$$1^{\text{wami}} = 1$$



$$\log_2 5 = x$$

$$\log_3 9 = 2 \quad \Rightarrow \quad 3^2 = 9$$

A handwritten diagram shows the number 3 circled, with an arrow pointing to the number 2, which is also circled. A vertical line separates this from the equation $3^2 = 9$. A curved arrow points from the circled 3 to the base 3 in the equation.

$$\log_x (-2) = \frac{1}{2} \quad \Rightarrow \quad x = \sqrt{-2}$$

A handwritten diagram shows the number -2 circled, with an arrow pointing to the fraction $\frac{1}{2}$. A vertical line separates this from the equation $x = \sqrt{-2}$. A curved arrow points from the circled -2 to the base x in the equation. Below the square root, the word "sqrt" is written.

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

$$\log_a N^k = x$$

$$[a > 0, \underline{a \neq 1}]$$

$$[N > 0]$$

$$\log_2 1 = \underline{\underline{0}}$$

$$\log_2 2 = \underline{1}$$

$$2^1 = 2$$

$$\log_e 5 = \ln 5$$

$$\ln 10 \neq \log_e 10$$

$$e = 2.71\dots$$

$$\ln e = ?$$

$$\log_e e = \underline{1}$$

$$\log_3 27 = 3 \rightarrow \text{27 (3) 3 3 3}$$

$\log_3 27 = 3$ → 27 (3) 3 3 3

$$\log_{10} 100 = 2$$
$$\log_{10} 1000 = 3$$

$$\log_{10} 10000 = 4$$
$$\log_{10} 1000000 = 6$$

$$\rightarrow \log_a^{M \times N} = \log_a^M + \log_a^N$$

$$\log_a^{\textcircled{M}} + \log_a^{\textcircled{N}} + \log_a^{\textcircled{P}} = \log_a^{MNP}$$

$$\log_a \frac{M}{N} = \log_a M - \log_a N$$

$$b^3 = b \times b \times b$$

$$\checkmark \log_a b^3$$

$$= \log_a \underline{b \times b \times b}$$

$$= \log_a b + \log_a b + \log_a b$$

$$\log_a b^{\textcircled{3}} = \textcircled{3} \log_a b$$

$$\log_a^b \log_a^5 = \log_a^b \log_a^5$$

$$\log_a^x \log_a^y = \log_a^y \log_a^x$$

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

$$\sqrt{100} = 10$$
$$100^{\frac{1}{2}} = 10$$

$$\log_{100} 10 = \frac{1}{2} = \log_{10} 100$$

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

$$\left[\log_{\text{pori}} \text{shakib} = \frac{1}{\log_{\text{shakib}} \text{pori}} \right]$$

$$\log_a b =$$

$$\frac{1}{\log_b a}$$

$$\frac{1}{\log_r y} =$$

$$\log_y r$$

✓

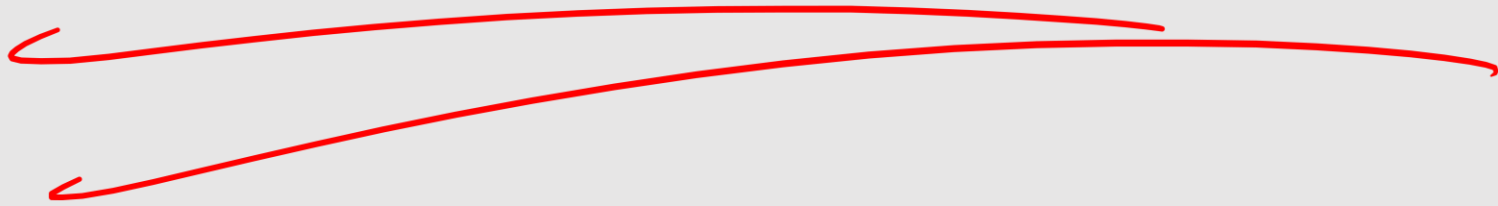
$$\log_{\text{Hasan}} \text{porzi} = \log_{\text{Raj}} \text{porzi} \times \log_{\text{Hasan}} \text{Raj}$$

$$\log_a^m = \frac{1}{\log_m a}$$

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


$$= \log_m b \times \frac{1}{\log_m a} = \frac{\log_m b}{\log_m a}$$

$$\rightarrow \log_a b = \frac{\log b}{\log a} \quad \checkmark$$



$$\log_{\text{poszi}} \text{uzzal} = \text{uzzal}$$

poszi

5 $\log_5 5$ 

= 

লগারিদমের সূত্রাবলি

• যদি $a^x = N$ ($a > 0, a \neq 1$) হলে, $x = \log_a N$ [যেখানে $N > 0$]

✓ • $\log_a(m \times n) = \log_a m + \log_a n$

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

✓ • $\log_a m^n = n \log_a m$

• $\log_a m = \log_b m \times \log_a b$ ✗

✓✓ • $\log_a m = \frac{\log m}{\log a}$

লগারিদমের সূত্রাবলি

• $a^{\log_a b} = b$

• $\log_a a = 1$

• $\log_a 1 = 0$

• $\log_a b = x$ হলে, $a^x = b$

• $x^{\log_a y} = y^{\log_a x}$

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

Type-1

মান নির্ণয়

$\log_3 81 =$ কত? $\text{Ans} \sim 4$

$$\sqrt{3} \times \sqrt{3} = \textcircled{3}$$

$$\textcircled{3}^4 = 81$$

$$(\sqrt{3} \times \sqrt{3})^4 = 81$$

$$(\sqrt{3})^8 = 81$$

$$\left[(\sqrt{3})^2 \right]^4 = 81 \Rightarrow (\sqrt{3})^8 = 81$$

$$2^{\textcircled{4}} = 16$$

$$(\sqrt{2})^8 = 16$$

$$3^3 = 27$$

$$(\sqrt{3})^6 = 27$$

$$5^{\textcircled{2}} = 25$$

$$(\sqrt{5})^4 = 25$$

$$\log_5 25 = 2$$

$$\log_{\sqrt{3}} 27 = 3$$

$$\log_{\sqrt{5}} 25 = 4$$

$$\log_{\sqrt{3}} 27 = 6$$

$\log_{\sqrt{3}} 81 =$ কত?

$$3^4 = 81$$

$$(\sqrt{3})^8 = 81$$

32 এর 2 ভিত্তিক লগ কত?

$$\log_2 32$$

$$= 5$$

$$\log_2 2^5$$

$$= 5 \log_2 2 = 5$$

$3\sqrt{3}$ এর 3 ভিত্তিক লগ কত?

$$\log_3 (3\sqrt{3})$$

$$\log_3 3^{3/2} = 3/2$$

$$3\sqrt{3}$$

$$= 3^1 \times 3^{1/2}$$

$$= 3^{1 + 1/2}$$

$$3\sqrt{3} = 3^{3/2}$$

$$\log_8 2 = ?$$

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

$$\log_2 8 = 3$$

$$\log_5 \sqrt{5} = ?$$

H.W



$$\frac{1}{2}$$

$$\log_{10} \underline{0.001} = ?$$

$$\log_{10} 10^{-3} = -3$$

$$0.001 = \frac{1}{1000}$$

$$= \frac{1}{10^3}$$

$$= 10^{-3}$$

$2^{\log_2 3 + \log_2 5}$ এর মান কত? [43 BCS]

$$2^{\log_2 3} \times 2^{\log_2 5}$$

$$a^{m+n} = a^m \times a^n$$

$$3 \times 5 = 15$$

$$\log_a b = x^k$$

$$\rightarrow a^x = b$$

Type-2

$$\log_x y = z$$
$$\Rightarrow x^z = y$$

log এর সমাধান



$\log_{10} x = 3$ হলে, x এর মান কত?

$$10^3 = x$$

$$x = 10^3 = 1000$$

$\log_{12} x = 4$ হলে, x এর মান কত?

H.W

$$12^4 = x$$

$$x = 12^4$$

$\log_5 x = 3$ হলে, x এর মান কত?

H. 4

$\log_x \left(\frac{1}{27} \right) = 3$ হলে x এর মান কত?

$$\left(\frac{1}{3} \right)^3 = \frac{1^3}{3^3} = \frac{1}{27}$$

$$x^3 = \frac{1}{27}$$

$$x^{\textcircled{3}} = \left(\frac{1}{3} \right)^{\textcircled{3}}$$

$$\left[x = \frac{1}{3} \right]$$

$\log_x \frac{1}{81} = -4$ হলে, x এর মান কত?

$$x^{-4} = \frac{1}{81}$$

$$\frac{1}{x^4} = \frac{1}{81}$$

$$x^4 = 81$$

$$x^4 = 81$$
$$x^{\textcircled{4}} = 3^{\textcircled{4}}$$

$$x = 3$$

$\log_x \frac{1}{9} = -2$ হলে, x এর মান কতো?

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

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

$$x^2 = 9$$

$$\Rightarrow x = +3$$

$$x^2 = 9$$

$$x = +3$$

$$+3$$

Type-3

Log এর সরলীকরণ



$$3 \log 2 + \log 5 = ?$$

$$\log 2^3 + \log 5$$

$$\log 8 + \log 5$$

$$\log 8 \times 5 = \log 40 \checkmark$$

$$\log_2 64 + \log_2 8 = ?$$

$$\begin{array}{ccc} \downarrow & & \downarrow \\ 6 & + & 3 \\ \hline & & = 9 \end{array}$$

$$\log_2 64 + \log_2 8$$

$$\log_2 64 \times 8 = \log_2 512 = 9$$

$$\log_{\sqrt{2}} 4 \times \log_{\sqrt{3}} 3 = ?$$

↓

$$4 \times 2 = 8$$

$$2^2 = 4$$

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

$$3^1 = 3$$

$$(\sqrt{3})^2 = 3$$

$$2 \log_{10} 5 + \log_{10} 36 - \log_{10} 9 = ?$$

$$\log_{10} 5^2 + \log_{10} \frac{36}{9}$$

$$\log_{10} 25 + \log_{10} 4$$

$$\log_{10} 25 \times 4 = \log_{10} 100$$

$$= 2$$

$$\log_2 \sqrt{6} + \log_2 \sqrt{\frac{2}{3}} = ?$$

$$\begin{aligned}\sqrt{6} &= \sqrt{3 \times 2} \\ &= \sqrt{3} \times \sqrt{2}\end{aligned}$$

$$\log_2 \sqrt{6} \times \sqrt{\frac{2}{3}}$$

$$\sqrt{\frac{2}{3}} = \frac{\sqrt{2}}{\sqrt{3}}$$

$$\begin{aligned}&= \log_2 \sqrt{3} \times \sqrt{2} \times \frac{\sqrt{2}}{\sqrt{3}} \\ &= \log_2 2 = 1\end{aligned}$$

$$\frac{\log 36}{\log 6} = \text{কত?}$$

$$\Rightarrow \log_6 36$$

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

$$\cancel{2} \times \textcircled{3} \times \frac{\textcircled{3}}{\cancel{2}}$$

$$\log \frac{M}{N} = \log M - \log N$$

$\log_2 \log_2 \log_2 16 =$ কত? ①

$$\log_2 16 = 4$$

$$\log_2 4 = 2$$

$$\log_2 (\log_2 (\log_2 16))$$

$$\log_2 (\log_2 4)$$

$$= \log_2 2 = 1$$

$$\log \frac{a^3 b^3}{c^3} + \log \frac{b^3 c^3}{d^3} + \log \frac{c^3 d^3}{a^3} - 3 \log b^2 c = ?$$

$$\log \frac{\cancel{a^3} \cancel{b^3}}{\cancel{c^3}} \times \frac{\cancel{b^3} \cancel{c^3}}{\cancel{d^3}} \times \frac{\cancel{c^3} \cancel{d^3}}{\cancel{a^3}} - \log (b^2 c)^3$$

$$= \log b^6 c^3 - \log b^6 c^3 = 0$$

$\log_a b \times \log_b c \times \log_c d =$ কতো?

$$\frac{\log b}{\log a} \times \frac{\log c}{\log b} \times \frac{\log d}{\log c}$$

$$\Rightarrow \frac{\log d}{\log a} = \log_a d$$

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

Thank You