লগারিদম

Md. Labu Miah

Instructor, P2A

বিগত বিসিএস এর প্রশ্ন বিশ্লেষণ

- $\log_{\sqrt{x}} 8 = 3\frac{1}{3}$ হলে x এর মান কত? [৪৬তম বিসিএস]
- যদি $\log\left(\frac{a}{b}\right) + \log\left(\frac{b}{a}\right) = \log(a+b)$ হয়, তবে- [৪৫তম বিসিএস]
- $2\log_{10} 5 + \log_{10} 36 - \log_{10} 9 = ?$ [৪৪তম বিসিএস]
- $2^{\log_2 3 + \log_2 5}$ [৪৩তম বিসিএস]
- $\log_x \frac{1}{9} = -2$ হলে, x এর মান কত? [৪২তম বিসিএস]
- $\log_2 \log_{\sqrt{e}} e^2 = ?$ [৪১তম বিসিএস]
- কোন শর্তে $\log \frac{1}{a} = 0$ [৪০তম বিসিএস]
- $\log_x \frac{1}{8} = -2$ হলে, x এর মান কত? [৩৮তম বিসিএস]
- $\log_x \frac{3}{2} = -\frac{1}{2}$ হলে, x এর মান কত? [৩৭তম বিসিএস]

বিগত বিসিএস এর প্রশ্ন বিশ্লেষণ

- $\log_{\sqrt{3}} 81 =$ কত? [৩৬তম বিসিএস]
- $\log_a x = 1, \log_a y = 2$ এবং $\log_a z = 3$ হলে, $\log_a \frac{x^3 y^2}{z}$ এর মান কত? [৩৫তম বিসিএস]

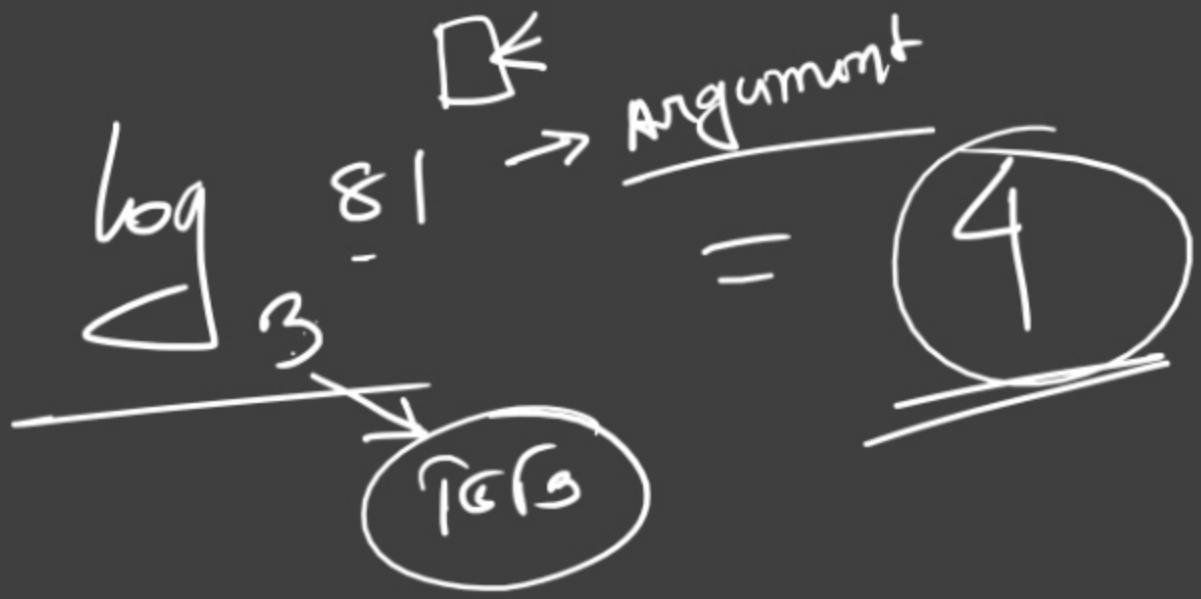
$2^{3} = 8$

$2^{\square} = 8$

Q. 2 কত ঘাতে গেলে 2 হবে তা নির্ণয় কর।

Ans: 3

$\log_2 8 = 3$



$3 \times 3 \times 3 \times 3 = 81$

$3^4 = 81$

$\log_a N = x$

$a \to$ (основание)

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

$\log_{-2} x = \frac{1}{2}$

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

$\log_1 4$

Ans:

$\log_0 5 =$

$1^1 = 1$

$1^2 = 1$

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

$\log_a N = x$

$N > 0$

$a^x = N$

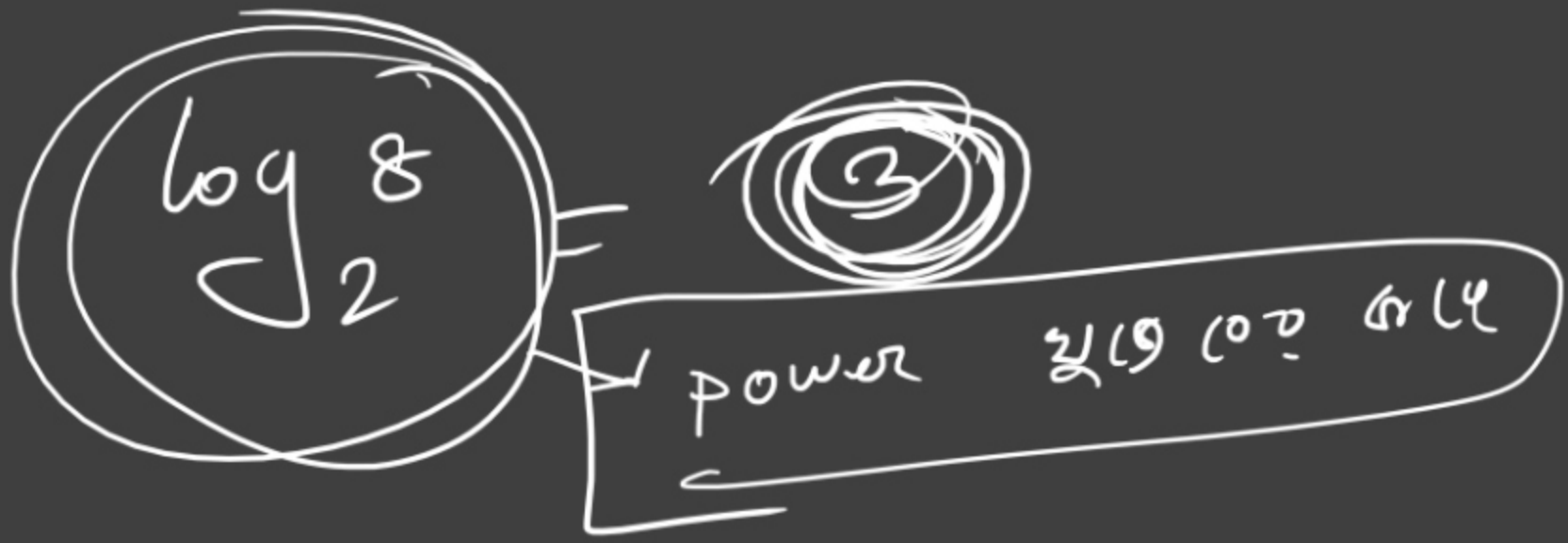
a ধ্রুবক সংখ্যা

$e = 2.\ldots$

$$2^{-2} = \frac{1}{2^2} = \frac{1}{4}$$

$$2^2 = 4$$

$$2^0 = 1$$


$\log_2 8$
3
power

$$a^{3} \times a^{2} = a^{3+2}$$

$$\log_a (M \times N) = \log_a M + \log_a N$$

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

$$\log_a m^3 = 3 \log_a m$$

$$\log_a m^3 = \log_a m \times m \times m = \log_a m + \log_a m + \log_a m$$

$$= 3 \log_a m$$

$8^{\frac{1}{3}} = 2^{3 \times \frac{1}{3}} = 2$

$\log_2 8 = 3$

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

or $\log_a b = \dfrac{1}{\log_b a}$

$$\log_2 64 = 6$$

$$\log_2 64 = \log_4 64 \times \log_2 4$$

$$6 = 3 \times 2$$

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

$$\log_{\text{খাদ্য}} \text{ক্যারিয়ার} = \log_{\text{মুরগী}} \text{ক্যারিয়ার} \times \log_{\text{খাদ্য}} \text{মুরগী}$$

$$\log_a^b = \log_m^b \times \log_a^M \quad (\times)$$

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

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

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

$$10^2 = 100$$

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

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

$\log_{10}^{100}$

$10 = 100$

$\log_{samira}^{shakib}$

Samira

= shakib

$\log_a^b$

$a = b$

$$\log_{10} 10 = 1$$

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

$$100^{\log_{10} 10} = 100^{1} = 100$$

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

$$x^{\log_a y} = y^{\log_a x}$$

$$\log_a N = x$$

$$a^x = N$$

লগারিদমের সূত্রাবলি

- যদি $a^x = \mathrm{N}\ (\mathrm{a} > 0, a \neq 1)$ 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?

$\log_{\sqrt{3}} 81 =$ কত?

$3^4 = 81$

$\left(3^{\frac{1}{2}}\right)^8 = 81$

$$\log_2 \frac{1}{32} = ?$$

$$\frac{1}{32} = \frac{1}{2^5} = 2^{-5}$$

$$-5$$

$$\log_2 32 = 5$$

$3\sqrt{3}$ এর 3 ভিত্তিক লগ কত?

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

$x\sqrt{x}$

$x^{3/2}$

$3\sqrt{3} = 3^1 \times 3^{\frac{1}{2}}$

$= 3^{1+\frac{1}{2}}$

$= 3^{3/2}$

$\log_8 2 = ?$

H.W

$\log_{2\sqrt{5}} 20 = ?$

2

$(2\sqrt{5})^1 = 2\sqrt{5}$

$(2\sqrt{5})^2 = 4 \times 5 = 20$

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

Ans

$$\log_{3\sqrt{2}} \frac{1}{324} = ?$$

-4

$$\log_{3\sqrt{2}} 324 = 4$$

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

$(3\sqrt{2})^2 = 9 \times 2 = 18$

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

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

$= 324$

$\log_3 243 =$ কত?

H.W

$\log_7 343 =$ কত?

H.W

$log_5 \sqrt[3]{5} =$ কত?

H.W

$\log_{10} 0.001 = ?$ -3

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

$10^3 = 1000$

$\log_5(\sqrt[3]{5}.\sqrt{5}) = ?$

$5/6$

$\sqrt[3]{5}.\sqrt{5}$

$5^{\frac{1}{3}} \times 5^{\frac{1}{2}}$

$5^{\frac{1}{3}+\frac{1}{2}} = 5^{\frac{5}{6}}$

$\log_2 \log_{\sqrt{e}} e^2 = ?$ 2

$\log_{\sqrt{e}} e^2 = 4$

$\log_2 \log_{\sqrt{e}} e^2$

$\log_2 4 = 2$

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

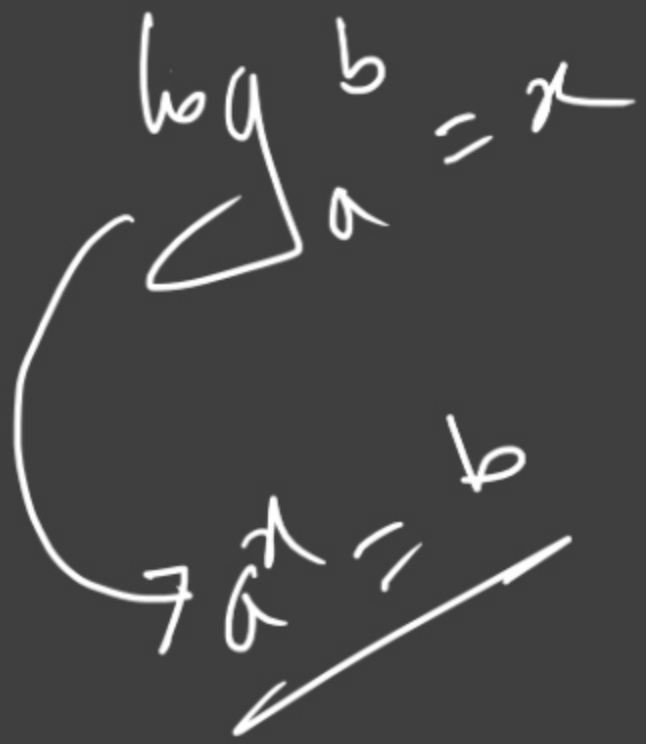
$(\sqrt{e})^4 = e^2$

$2^{\log_2 3+\log_2 5}$ এর মান কত?

$2^{\log_2 15} = 15$

$\log_2 3 + \log_2 5$

$= \log_2 3\times 5 = \log_2 15$



Type-2

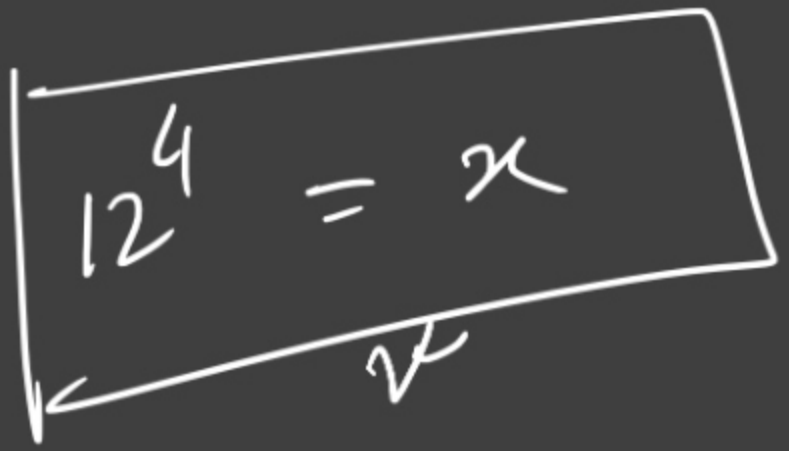
log এর সমাধান

$\log_{10} x = 3$ হলে, x এর মান কত?

$10^3 = x$

$1000 = x$

$\log_{12} x = 4$ হলে, x এর মান কত?



$\log_x 4 = 2$ হলে, x এর মান কত? (2)

$x^2 = 4$

$x = \pm\sqrt{4}$

$= \pm 2$

$(-2)^2 = 4$

$(2)^2 = 4$

$\log_x 144 = 4$ হলে, x এর মান কত?

Hw

$\log_{2\sqrt{5}} 400 = x$ হলে x এর মান কত?

4

$(2\sqrt{5})^4 = 16 \times 25 = 400$

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

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

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

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

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

Hw

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

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

$x^{-4} = 3^{-4} \Rightarrow \boxed{x = 3}$

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

H.W

$\log_x \frac{3}{2} = -\frac{1}{2}$ হলে x এর মান কতো?

$\log_{\sqrt{8}} x = 3\frac{1}{3}$ হলে x এর মান কত?

$\log_{\sqrt{8}} x = \frac{10}{3}$

$\sqrt{8}^{\frac{10}{3}} = x$

$\therefore x = 32$

$8^{\frac{1}{2} \times \frac{10}{3}}$

$2^{3 \times \frac{1}{2} \times \frac{10}{3}}$

$2^5 = 32$

$\log_a x = 1$, $\log_a y = 2$ এবং $\log_a z = 3$ হলে, $\log_a \frac{x^3 y^2}{z} = ?$

$a^1 = x$ | $a^2 = y$ | $a^3 = z$

$$\log_a \frac{x^3 y^2}{z} = \log_a \frac{a^3 (a^2)^2}{a^3}$$

$$= \log_a a^q = q$$

Type-3

Log এর সরলীকরণ

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

$\log 2^3 + \log 5$

$\log 8 + \log 5 = \log 8 \times 5 = \boxed{\log 40}$

$\log_2 64 + \log_2 8 = ?$

$6 + 3 = 9$

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

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

$$4 \times 2 = 8$$

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

$$= \log_{10} 25 + \log_{10} 36 - \log_{10} 9$$

$$= \log_{10} \frac{25 \times 36}{9} = \log_{10} 100 = 2$$

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

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

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

$$\sqrt{6} = \sqrt{2 \times 3}$$

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

$$= \log_2 2 = 1$$

$\frac{\log 36}{\log 6} =$ কত?

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

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

$$\log_2 \frac{1}{2} = 0$$

$= \log_2 \log_2 \log_2 16 =$ কতো?

$\log_2^{16} = 4$

$\log_2^{4} = 2$

$\log_2 \log_2^{4}$

$= \log_2^{2} = 1$

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

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

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

Type-4

বিবিধ

$$\log_7\left(\sqrt[5]{7}.\sqrt{7}\right) - \log_3 \sqrt[3]{3} + \log_4 2 = \text{কতো?}$$

$7^{\frac{1}{5}} \cdot 7^{\frac{1}{2}}$

$7^{\frac{1}{5}+\frac{1}{2}} = 7^{\frac{7}{10}}$

$4^{\frac{1}{2}} = 2$

$$\frac{7}{10} - \frac{1}{3} + \frac{1}{2} = \frac{21-10+15}{30}$$

$$= \frac{26}{30} = \frac{13}{15}$$

$\log(a^a . b^b . c^c) = 0$ হলে $a^a . b^b . c^c = ?$

$\log_2 1 = 0$

$a^a . b^b . c^c = 1$

$\log_4 2 = \frac{1}{\log_2 4} = \frac{1}{2}$

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

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

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

$\log_{\sqrt{a}} b \cdot \log_{\sqrt{b}} c \cdot \log_{\sqrt{c}} a$ এর মান কতো?

$$\frac{2\log\sqrt{b}}{\log\sqrt{a}} \times \frac{2\log\sqrt{c}}{\log\sqrt{b}} \times \frac{2\log\sqrt{a}}{\log\sqrt{c}}$$

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

$\log_a \log_a \log_a (a^{a^{a^b}})$ = কতো?

H.w

$\log_2 \log_2 \log_2 4^b$

Ans: b

$\log_a (a^{a^b})$

$\log_a a^{a^b}$

$\log_a a^b$

$= b$

$$\log_k \frac{a^n}{b^n} + \log_k \frac{b^n}{c^n} + \log_k \frac{c^n}{a^n} = \text{কতো?}$$

Hw

$p = \log_a(bc)$ হলে, $p + 1 = ?$

$$p = \log_a bc$$

$$p + 1 = \log_a bc + 1$$

$$= \log_a bc + \log_a a$$

$$= \log_a abc$$

Thank You