সূচক

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৪৬তম বিসিএস

- $\frac{1}{2} \times 2^{x-3} + 1 = 5$ হলে x এর মান কত?

৪৫তম বিসিএস

- $2^{x+7} = 4^{x+2}$ হলে x এর মান কত?

৪৪তম বিসিএস

- $\sqrt[4]{x^3} = 2$ হয় তবে, $x^{\frac{3}{2}} = ?$

৪৩তম বিসিএস

- $4^x + 4^{1-x} = 4$ হলে, $x =$ কত?

৪১তম বিসিএস

• $\sqrt{-8} \times \sqrt{-2} = ?$ জটিল রাশি

৪০তম বিসিএস

- $y^{y\sqrt{y}} = (y\sqrt{y})^{y}$ হলে y এর মান কত?

৩৯তম বিসিএস

- $125\ (\sqrt{5})^{2x} = 1$ হলে, x এর মান কত ?

৩৮তম বিসিএস

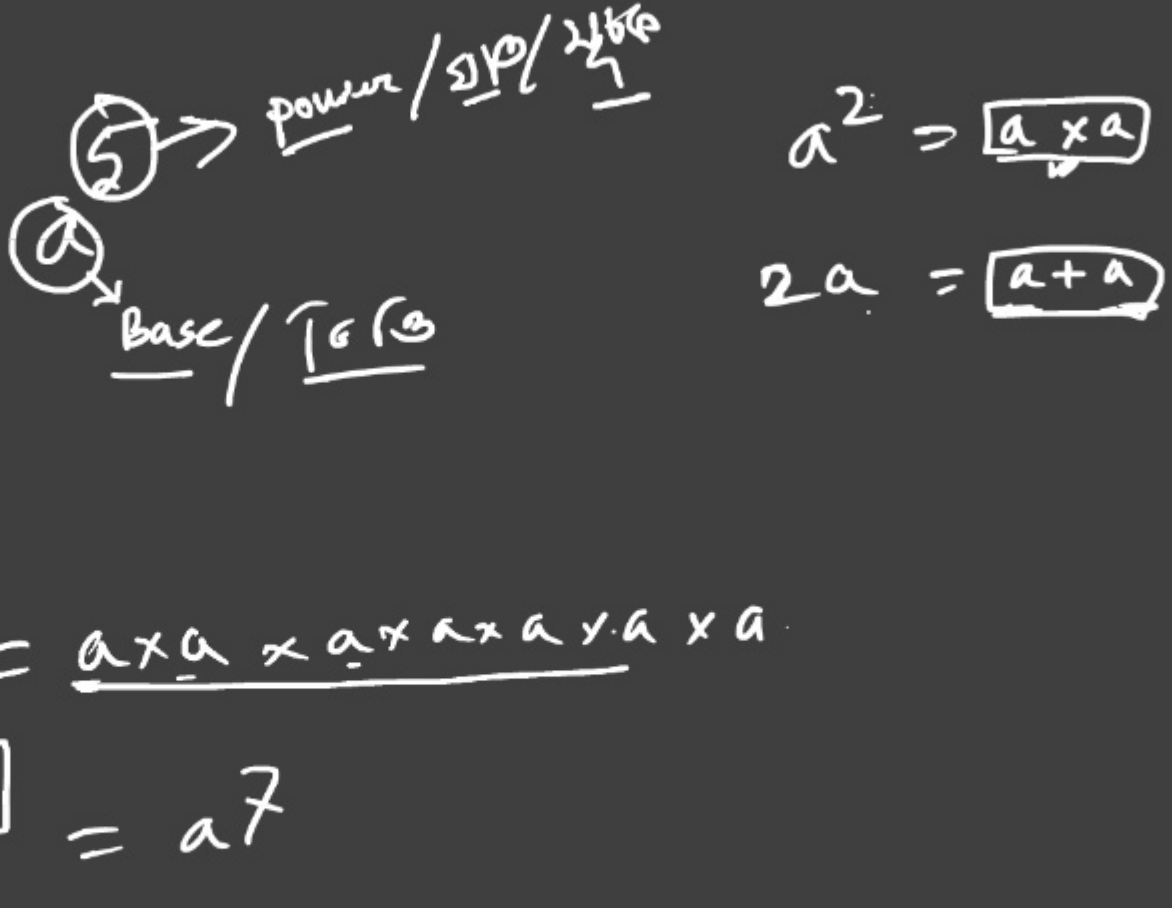
- $2^x + 2^{1-x} = 3$ হবে, $x = ?$

৩৬তম বিসিএস

• $(25)^{2x+3} = 5^{x+6}$ হয়, তবে x =?

৩৫তম বিসিএস

$x^{-3} - 0.001 = 0$ হলে x^2 এর মান কত ?


5 → power / ঘাত / শক্তি
a → Base / ভিত্তি
$a^2 = a \times a$
$2a = a + a$
$a^2 \times a^5 = a \times a \times a \times a \times a \times a \times a$
$2 + 5$
$= a^7$

$$a^5 \div a^2 = \frac{a^5}{a^2} = \frac{a \times a \times a \times a \times a}{a \times a} = a^3$$

$$a^{5-2} = a^3$$

$$\frac{a^2}{a^{10}} = a^{2-10} = a^{-8}$$

$$\frac{a^5}{a^5} = 1$$

$$a^{5-5} = 1$$

$$\boxed{a^0 = 1} \quad [a \neq 0]$$

0^0 → অসংজ্ঞায়িত

$\frac{0}{0}$ → অনির্ণেয়

$\frac{3}{0}$ → অসংজ্ঞায়িত

$$\frac{a^0}{a^5} = a^{0-5} = a^{-5}$$

$$a^0 = 1$$

$$\frac{1}{a^5} = a^{-5}$$

$$a^{-5} = \frac{1}{a^5}$$

$$a^5 = \frac{1}{a^{-5}}$$

$$(a \cdot b)^n = a^n b^n$$

$$\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n}$$

$(2 \times 3)^2 = 6^2 = 36$

$2^2 \times 3^2 = 36$

$\times (a+b)^n = a^n + b^n$ ✗

$\times (a-b)^n = a^n - b^n$ ✗

$(2+3)^2 = 5^2 = 25$

$\times (2+3)^2 \neq 2^2 + 3^2$

$= 4 + 9$

$= 13$

$$a^n = \frac{1}{a^{-n}}$$

$$\left(\frac{a}{b}\right)^n = \frac{1}{\left(\frac{a}{b}\right)^{-n}}$$

$$= \frac{1}{\frac{a^{-n}}{b^{-n}}}$$

$$= 1 \times \frac{b^{-n}}{a^{-n}} = \left(\frac{b}{a}\right)^{-n}$$

$$\left(\frac{a}{b}\right)^n = \left(\frac{b}{a}\right)^{-n}$$

$$\left(\frac{a}{b}\right)^{-n} = \left(\frac{b}{a}\right)^n$$

$(2^2)^3 = 4^3 = 64$

$(2^3)^2 = 8^2 = 64$

$(2^3)^{②} = 2^6 = 64$

$(2^2)^3 = (2^3)^2 = 2^6$

$\frac{2\times3}{3\times2}$

$$\therefore (a^m)^n = (a^n)^m = a^{mn}$$

$$a^{2^3} = a^{3^2} = a^6$$

$$a^8 \neq a^9 \neq a^6$$

$$(a^2)^3 = \frac{a^2 \times a^2 \times a^2}{a^{2^3}} = a^{(2\times2\times2)}$$

$\sqrt[2]{a^1} = a^{\frac{1}{2}}$

$\sqrt[n]{a^1} = a^{\frac{1}{n}}$

$\sqrt[3]{a^1} = a^{\frac{1}{3}}$

$\sqrt[5]{a^2} = (a^2)^{\frac{1}{5}}$

$= a^{\frac{2}{5}}$

$\sqrt[4]{a^1} = a^{\frac{1}{4}}$

$\sqrt[100]{a^1} = a^{\frac{1}{100}}$

$$\sqrt[y]{a^{x}} = a^{\frac{x}{y}}$$

$$\left(\sqrt[3]{a}\right)^{5} = \left(a^{\frac{1}{3}}\right)^{5}$$

$$= a^{5/3}$$

$$\sqrt[n]{a^m} = a^{\frac{m}{n}}$$

$$\left(\sqrt[n]{a}\right)^m = a^{\frac{m}{n}}$$

$$\begin{cases} a^m = a^n \\ \Rightarrow m = n \text{ w} \end{cases} \qquad \begin{cases} a^m = b^m \\ \Rightarrow a = b \end{cases}$$

$(-2)^{1} = 2^{2}$

$-2 = 2$

$2(0 \text{ or } 1)$

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

= কিন্তু আসলে কারণ কেন?

$$(Alif)^8 = (Ashik)^8 \Rightarrow \underline{Alif} = \underline{Ashik}$$

সূচকের সূত্রাবলী:

- ❖ $a^m \times a^n = a^m . a^n = a^{m+n}$
- ❖ $\frac{a^m}{a^n} = a^m \div a^n = a^{m-n}$
- ❖ $(ab)^n = a^n \times b^n = a^n b^n$
- ❖ $\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n}$

সূচকের সূত্রাবলী:

- ✓ ❖ $(a^n)^m = (a^m)^n = a^{mn}$
- ✓ ❖ $a^{n^m} \neq a^{m^n}$
- ✓ ❖ $a^0 = 1\ (a \neq 0)$
- ✓ ❖ $a^{-n} = \frac{1}{a^n}$
- ✓ ❖ $a^n = \frac{1}{a^{-n}}$

সূচকের সূত্রাবলী:

- $\left(\frac{a}{b}\right)^n = \left(\frac{b}{a}\right)^{-n}$
- $\sqrt{a} = a^{\frac{1}{2}}$
- $\sqrt[n]{a} = a^{\frac{1}{n}}$
- $\sqrt[n]{a^m} = a^{\frac{m}{n}}$
- $a^x = b^x$ হলে, $a = b$ $[a > 0, b > 0$ এবং $x \neq 0]$
- $a^x = a^y$ হলে, $x = y$ $[a > 0$ এবং $a \neq 1]$

Type-1

সূচকের মান নির্ণয়

$(\sqrt{3} \times \sqrt{4})^4$ এর মান কত?

$$\left(\sqrt{3 \times 4}\right)^4$$

$$= 12^{\frac{1}{2} \times 4}$$

$$= 12^2 = 144$$

$\sqrt[n]{a^m}$ এর মান কত?

$(a^{-1})^{-1}$ এর মান কত?

$+1$

a^1

$= a$

$(\sqrt[3]{2^6})^2$ এর মান কত?

$$\left(2^{\frac{6}{3}}\right)^2$$

$$2^4 = 16$$

$(\sqrt{3})^6$ এর মান কত?

H.W

$\left(\frac{125}{27}\right)^{-\frac{2}{3}}$ এর সহজ প্রকাশ কোনটি?

$\left(\frac{27}{125}\right)^{\frac{2}{3}}$

$\left(\frac{3}{5}\right)^{3\times\frac{2}{3}}$

$\left(\frac{3}{5}\right)^{2} = \frac{9}{25}$

$\left(\frac{27}{125}\right)^{\frac{3}{2}}$ ✗

$\sqrt[3]{\sqrt[3]{a^3}} =$ কত?

H.W

$\left(\sqrt[3]{3} \times \sqrt[3]{4}\right)^6 =$ কত?

H.w

$3^x + 3^x + 3^x = ?$

$3x + 3x + 3x$

$3x$

Rubina + Rubina + Rubina

$= 3 \times 3^x$

$= 3 \times$ Rubina

$3^x (1 + 1 + 1)$

$4 + 4 + 4 \Rightarrow 4(1 + 1 + 1)$

4×3

$3^x \times 3^1$

$= 3^{x+1}$

$3 \times 4 = 12$

$4^x + 4^x + 4^x + 4^x$ = কত?

4×4^x

$= 4^{1+x}$

$= (2^2)^{1+x}$

$= 2^{2+2x}$

$\sqrt{41 - \sqrt{21 + \sqrt{19 - \sqrt{9}}}}$ এর মান কত?

3

$\sqrt{16} = 4$

$\sqrt{25} = 5$

$\sqrt{36} = 6$

$\sqrt{10\sqrt{10\sqrt{10\sqrt{10\sqrt{10}}}}\ldots\ldots\ldots\infty}$ এর মান কত?

$= x$

$\sqrt{10\sqrt{10\sqrt{10\sqrt{10}}}\ldots\infty} = x^2$

$10\sqrt{10\sqrt{10\sqrt{10\sqrt{10}}}\ldots\infty} = x^2$

$\Rightarrow 10x = x^2$

$x^2 - 10x = 0$

$x(x-10) = 0$

$x = 0$ অথবা $x - 10 = 0$

$x = 10$

$$\frac{2^{x+4} - 4.2^{x+1}}{2^{x+2} \div 2} = \text{কত?}$$

9. $2^n - 2.2^{n-1}$ = কত?

$9.2^n - 2.\frac{2^n}{2^1}$

$9.2^n - 2^n$

$2^n(9-1)$

$2^n.8 = 2^n.2^3 \Rightarrow$ $n+3$, 2

$\Rightarrow 8.2^n$

$8^{\frac{3}{4}} \div 8^{\frac{1}{2}} =$ কত?

H.W

$$\frac{\sqrt[3]{7^2}\cdot\sqrt[3]{7}}{\sqrt{7}} = \text{কত?}$$

$$\frac{7^{\frac{2}{3}}\cdot 7^{\frac{1}{3}}}{\sqrt{7}}$$

$$= \frac{7^{\frac{2}{3}+\frac{1}{3}}}{\sqrt{7}} = \frac{7^{\frac{3}{3}}}{\sqrt{7}} = \frac{7}{\sqrt{7}}$$

$$= \frac{\sqrt{7}\cdot\sqrt{7}}{\sqrt{7}} = \sqrt{7}$$

$\Rightarrow a^x = a^y \Rightarrow x = y$

$\Rightarrow a^x = b^x \Rightarrow a = b$

Type-2

✓ সূচকের সমাধান

$x^3 = 27$ হলে $x = ?$

$x^3 = 3^3$

$x = 3$

$4^x = 8$ হলে $x = ?$

$4^x = 4^2$

$(2^2)^x = 2^3$

$2^{2x} = 2^3$

$2x = 3$

$x = 3/2$

$\sqrt[4]{x} = 0.1$ হলে $x = ?$

$(\sqrt[4]{x})^4 = (0.1)^4$

$x = (0.1)^4$

$= 0.1 \times 0.1 \times 0.1 \times 0.1$

$= 0.0001$

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

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

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

$(\sqrt[n]{a})^n = a$

$2^{x+1} = 32$ হলে, $x = ?$

H.w

যদি $\sqrt[4]{x^3} = 2$ হয়, $x^{\frac{3}{2}} = ?$

$x^{\frac{3}{4} \times 2} = 2^2$

$x^{\frac{3}{2}} = 4$

$\frac{3}{4} \times 2 = \frac{3}{2}$

যদি $(25)^{2x+3} = 5^{3x+6}$ হয়, তবে x = কত?

$(5^2)^{2x+3} = 5^{3x+6}$

$5^{4x+6} = 5^{3x+6}$

$4x = 3x$

$125(\sqrt{5})^{2x} = 1$ হলে, x এর মান কত?

$5^3 \cdot \left(5^{\frac{1}{2}}\right)^{2x} = 1$

$5^3 \cdot 5^x = 1$

$5^{3+x} = 5^0$

$3 + x = 0 \Rightarrow x = -3$

$5^x + (8 \times 5^x) + (16 \times 5^x) = 1$ হলে, x এর মান কত?

$5^x(1 + 8 + 16) = 1$

$5^x \cdot 25 = 1$

H.W

$x^{x\sqrt{x}} = (x\sqrt{x})^x$ হলে, x এর মান কত?

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

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

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

$x\sqrt{x} - \frac{3x}{2} = 0$

$x\left(\sqrt{x} - \frac{3}{2}\right) = 0$

$x = 0$, $\sqrt{x} - \frac{3}{2} = 0$

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

$x = \frac{9}{4}$

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

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

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

$= x^{\frac{3}{2}}$

$\frac{3}{2} \times x$

$3x^2 = 5x$

$3x = 5$

$x = \frac{5}{3}$

$x = 0$

$(\sqrt{3})^{x+1} = (\sqrt[3]{3})^{2x-1}$ হলে x এর মান কত?

$27^{x+1} = 81$ হলে, $x =$?

$36.2^{3x-8} = 3^2$ হলে x এর মান কত?

$\left(\frac{a}{b}\right)^{x-3} = \left(\frac{b}{a}\right)^{x-5}$ হলে $x =$ কত ?

$\left(\frac{a}{b}\right)^{n-3} = \left(\frac{a}{b}\right)^{-n+5}$

H.W

$2^x + 2^{1-x} = 3$ হলে x = কত?

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

$m + \frac{2}{m} = 3$ $\left[2^x = m\right]$

$m^2 + 2 = 3m$

$m^2 - 3m + 2 = 0$

$m^2 - 2m - m + 2 = 0$

$m(m-2) - 1(m-2) = 0$

$(m-2)(m-1) = 0$

$m = 2$ | $m = 1$

$2^x = 2^1$ | $2^x = 2^0$

$x = 1$ | $x = 0$

$3^{x+2} = 81$ হলে, 3^{x-2} এর মান কত?

H.W

Ans: 1

$10^{-15} \div 10^{-4} = ?$

10^{-11}

Type-3

সূচকের সরলীকরণ

$\sqrt{x^{-1}.y}.\sqrt{y^{-1}.z}.\sqrt{z^{-1}.x}$ এর মান কত? যখন $(x > 0, y > 0, z > 0)$

$$\sqrt{\frac{1}{x}.y.\frac{1}{y}.z.\frac{1}{z}.x}$$

$$\sqrt{1}$$

$$= 1$$

$(2a^{-1} + 3b^{-1})^{-1}$ এর মান কত?

$$\left(\frac{2}{a} + \frac{3}{b}\right)^{-1}$$

$$\left(\frac{2b+3a}{ab}\right)^{-1} = \frac{ab}{3a+2b}$$ Ans

$$\frac{3^{m+1}}{(3^m)^{m-1}} \div \frac{9^{m+1}}{(3^{m-1})^{m+1}}$$ এর মান কত?

$$= \frac{3^{m+1}}{3^{m^2-m}} \div \frac{3^{2m+2}}{3^{m^2-1}}$$

$$= 3^{m+1-m^2+m} \div 3^{2m+2-m^2+1}$$

$$= 3^{2m-m^2+1-2m+m^2-3} = 3^{-2} = \frac{1}{3^2} = \frac{1}{9}$$

$\frac{3^{x+4}-9\times3^{x+1}}{3^{x+2}}$ এর মান কত?

H.W

Ans: 6

$\frac{5^{n+2}+35\times5^{n-1}}{4\times5^{n}}$ এর মান কত?

H.W

Ans: 8

$$\left(\frac{a^m}{a^n}\right)^l \left(\frac{a^n}{a^l}\right)^m \left(\frac{a^l}{a^m}\right)^n = ?$$

$$\frac{a^{ml}}{a^{nl}} \times \frac{a^{mn}}{a^{ml}} \times \frac{a^{nl}}{a^{mn}}$$

$$= 1$$

$$\sqrt[mn]{\left(\frac{x^m}{x^n}\right)} \times \sqrt[nl]{\left(\frac{x^n}{x^l}\right)} \times \sqrt[lm]{\left(\frac{x^l}{x^m}\right)} = ?$$

H.W

$$\left(\frac{x^{p+q}}{x^{2r}}\right)\left(\frac{x^{q+r}}{x^{2p}}\right)\left(\frac{x^{p+r}}{x^{2q}}\right) = ?$$

H.W

Ans: 1

Type-4

বিবিধ

$a^x = b$, $b^y = c$, $c^z = a$ হয় তবে xyz = কত?

$a^x = b$

$(c^z)^x = b$

$c^{zx} = b$

$(b^y)^{zx} = b$

$b^{xyz} = b^1$

$xyz = 1$

$8^{x^2} = 2^{3x}$ হলে x এর মান কত?

$(2)^{3x^2} = (2)^{3x}$

$3x^2 = 3x$

$3x = 3$

$x = 1$

$x = 0$

$\sqrt[3]{y^5} = 2\sqrt[3]{y^2}$ হলে $y =$ কত?

$y^{\frac{5}{3}} = 2\, y^{\frac{2}{3}}$

$\frac{y^{5/3}}{y^{2/3}} = 2$

$y^{\frac{5}{3}-\frac{2}{3}} = 2$

$y^1 = 2$

$y = 2$

$a^{\frac{1}{x}} = b^{\frac{1}{y}} = c^{\frac{1}{z}}$ এবং $abc = 1$ হলে $x + y + z =$ কত?

$a^{\frac{1}{x}} = b^{\frac{1}{y}} = c^{\frac{1}{z}} = m$ (ধরি)

$a^{\frac{1}{x}} = m$

$a = m^x$

$b = m^y$

$c = m^z$

$abc = 1$

$m^x \cdot m^y \cdot m^z = 1$

$m^{x+y+z} = m^0$

$x+y+z = 0$

$a^b = b^a$, $a = 2b$ এবং $a \neq 0, b \neq 0$ হলে a ও b এর মান কত?

$a^b = b^a$

$(2b)^b = b^{2b}$

$2^b \cdot b^b = (b^b)^2$

$2^b \cdot b^b = b^b \cdot b^b$

$2^b = b^b$

$b = 2$

$a = 2 \cdot 2 = 4$

$a^x = p, a^y = q$ এবং $a^2 = (p^y q^x)^z$ হয় তবে, $xyz = ?$

$(p^y q^x)^z = a^2$

$(a^{xy} \cdot a^{xy})^z = a^2$

$a^{xy+xy)z} = a^2$

$a^{2xyz} = a^2$

$2xyz = 2$

$xyz = 1$

$9^x = 27^y$ হলে, $\frac{x}{y}$ এর মান কত?

$(3)^{2x} = (3)^{3y}$

$2x = 3y$

$$\frac{x}{y} = \frac{3}{2}$$

Ans

Thank You