সূচক

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P2A


সূচক

$$\begin{array}{r} (3)a + 4b \\ + \quad (4)a + 1b \\ \hline 7a + 5b \end{array}$$

$3a \times 4a = 12$

$1 \times 1 \times = 1$

$a^1 \times a^1 \times a^1 = a^3$

$$\begin{array}{r} 1a \\ 1a \\ +1a \\ \hline 3a \end{array}$$

a^3

3 → সূচক/ঘাত/ power

a → ভিত্তি/ Base

$$a^3 \times a^4 = a \times a \times a \times a \times a \times a \times a = a^7$$

$$a^3 \times a^4 = a^{3+4} = a^7$$

$$a^8 \times a^3 = a^{11}$$

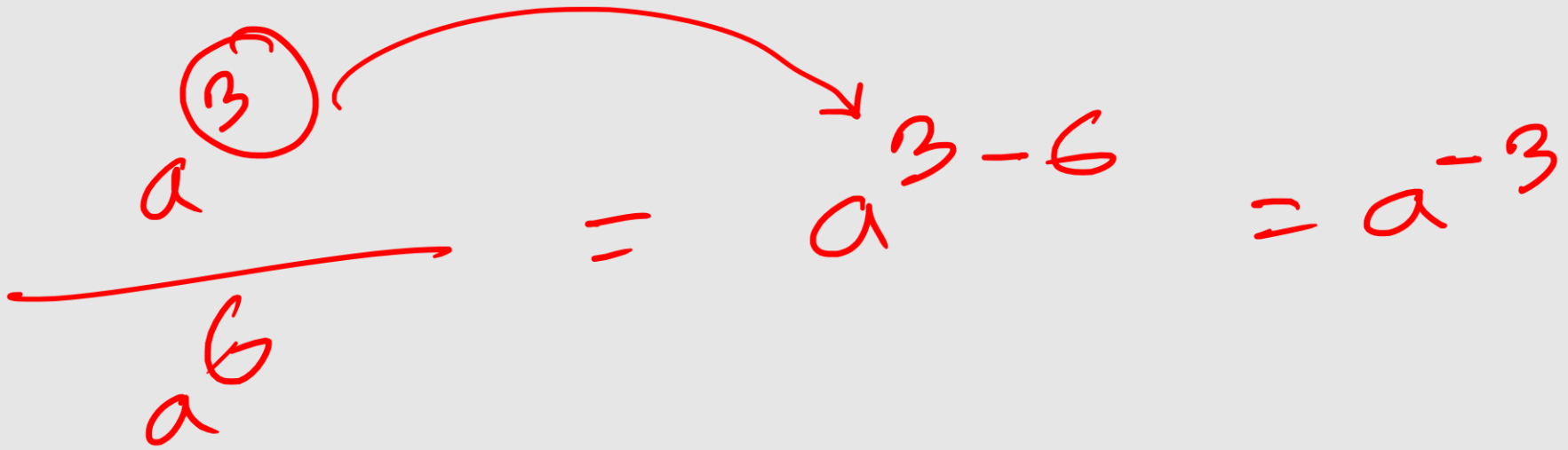
$$a^3 \times b^2 = a^3 b^2$$

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

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

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

$$\frac{a^5}{a^3} = a^{5-3}$$


3
a
a
6
=
a^{3-6}
= a^{-3}

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

$$5 - 5 = 0$$

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

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

$(\text{Akhi})^0 = 1$ [Akhi $\neq 0$]

$a^0 = 1$

$b^0 = 1$

$c^0 = 1$

$$\frac{1}{a^5} = \frac{a^0}{a^5}$$

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

$$\boxed{a^0 = 1}$$

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

$$\frac{1}{a^{-4}} = \frac{a^0}{a^{-4}} = a^{0-(-4)} = a^4$$

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

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

$a \times a = a^2$

$5^2 = 25$

$\rightarrow 5 \times 5$

$\rightarrow$ Aklima $\times$ Aklima $= (\text{Aklima})^2$

$\rightarrow a^5 \times a^5 = (a^5)^2 = a^{10}$

$\leftarrow$ $a^{5+5} = a^{10}$

monir × monir × monir = monir^3

$5^3 = 125$

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

$a^5 \times a^5 \times a^5 = (a^5)^3 = a^{5\times3} = a^{15}$

$a^{5+5+5} = a^{15}$

$(a^2)^3 = ?$

① a^8 ×

② a^6

$(a^3)^2 = ?$

① a^9

✓ ② a^6

$(a^2)^3 = (a^3)^2$

$=$

↓ ↓

a^6 a^6

$\checkmark 2 \times 3 = 6$

$\checkmark 3 \times 2 = 6$

$$(a^m)^n = (a^n)^m = a^{m \times n}$$

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

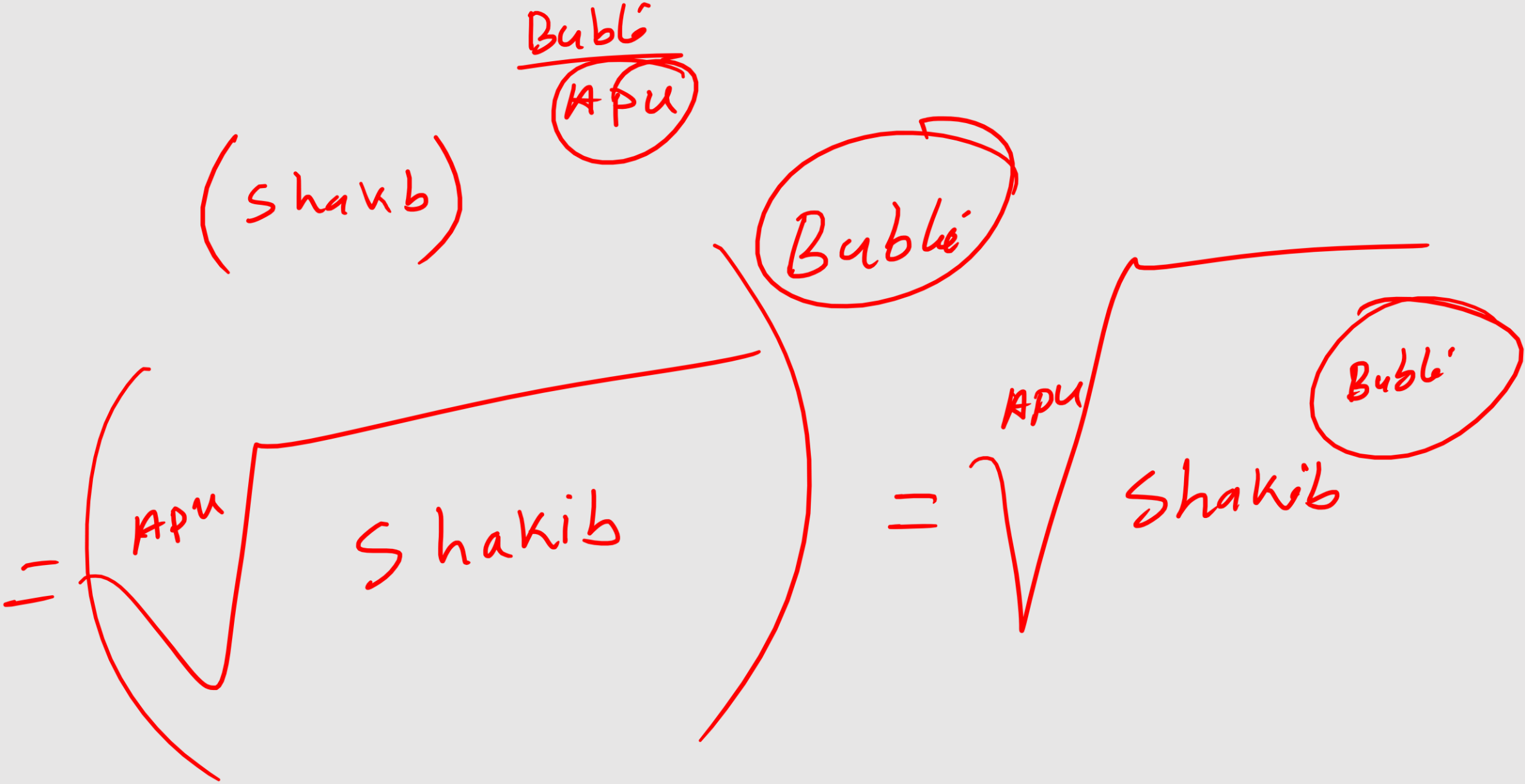
$$a^{\frac{1}{3}} = \sqrt[3]{a}$$

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

$$\frac{1}{\text{Apu}}$$

Shakib

$$= \sqrt[\text{Apu}]{\text{Shakib}}$$


Bubli
Apu
(shakib)
Bubli
=
Apu
Shakib
=
Apu
Bubli
Shakib

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

$$a^{\frac{4}{3}} = \left(\sqrt[3]{a}\right)^{4} = \sqrt[3]{a^4}$$

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

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

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

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

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

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

$$\left(\frac{x}{y}\right)^{-n} = \left(\frac{y}{x}\right)^{+n}$$

$$a^m = a^n \Rightarrow m = n \quad [a \neq 1, a > 0$$

$$1^4 = 1^3 \Rightarrow 3 = 4$$

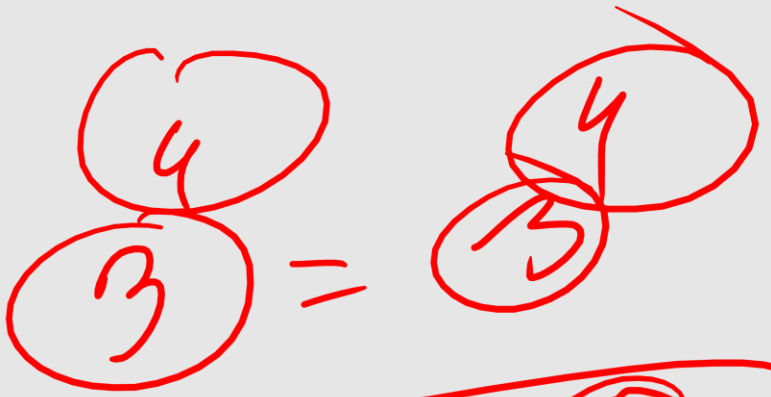
$$1 = 1$$

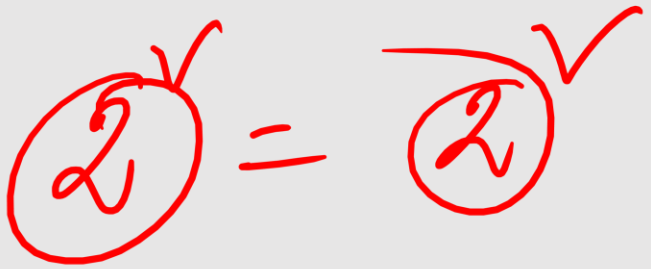
$$1 = 2$$

$2^2 \neq 2^3$

$4 = 8$

$2 \neq 3$





$$a^m = b^m \mid \Rightarrow a = b \left[a > 0,\ b > 0;\ m \neq 0 \right.$$

$$3^{>0} = 4^{>0} \Rightarrow 3 = 4$$

$3^{>0} \to 1$

$4^{>0} \to 1$

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

$$= 3^2 \times 2^2 = 9 \times 4 = 36$$

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

$$(a \times b \times c)^3 = a^3 \times b^3 \times c^3$$

$$\left(\frac{a}{b}\right)^4 = \frac{a^4}{b^4}$$

$$\frac{a^4}{b^4} = \left(\frac{a}{b}\right)^4$$

$$a^4 \times b^4 \times c^4 = (a \times b \times c)^4$$

$$(a \times b)^2 = a^2 b^2$$

$$\left(\frac{a}{b}\right)^2 = \frac{a^2}{b^2}$$

$$* \begin{cases} (a+b)^2 \neq a^2 + b^2 \\ (a-b)^2 \neq a^2 - b^2 \end{cases}$$

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

$a^{3^2} = a^9$

$2^3 = 8$

$a^{2^3} = a^8$

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

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

$(a^2)^3 = (a^3)^2$

$a^{23} \neq a^{32}$

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?

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

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

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

$= 3^2 \times 4^2$

$= 9 \times 16 = 144$

$\sqrt[n]{a^m}$ এর মান কত?

$a^{\frac{m}{n}}$

$(a^{-1})^{-1}$ এর মান কত? $= a$

$a^{(-1)\times(-1)}$

$a^{+1} = a$

$\sqrt[3]{\sqrt[3]{a^3}}$ = কত?

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

$\sqrt[3]{\sqrt[3]{a}}$

$= \sqrt[3]{a}$

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

$a^{\frac{3}{3\times 3}}$

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

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

$\frac{1}{3}$ ≠ − 3

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

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

$\frac{6}{3}^2 \qquad \frac{6}{3}^2$

$= 3 \times 4$

$= 3^2 \times 4^2 = 9 \times 16 = 144$

মুণ্ডী + মুণ্ডী + মুণ্ডী

$$= \frac{3 \times \text{মুণ্ডী}}{\text{Bithi} + \text{Bithi} + \text{Bithi} + \text{Bithi}}$$

$$= \frac{\text{মুণ্ডী}}{4 \times \text{Bithi}}$$

$9^x + 9^x + 9^x = ?$

$= 3 \cdot 9^x$

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

$= 3^1 \cdot 3^{2x} = 3^{1+2x}$

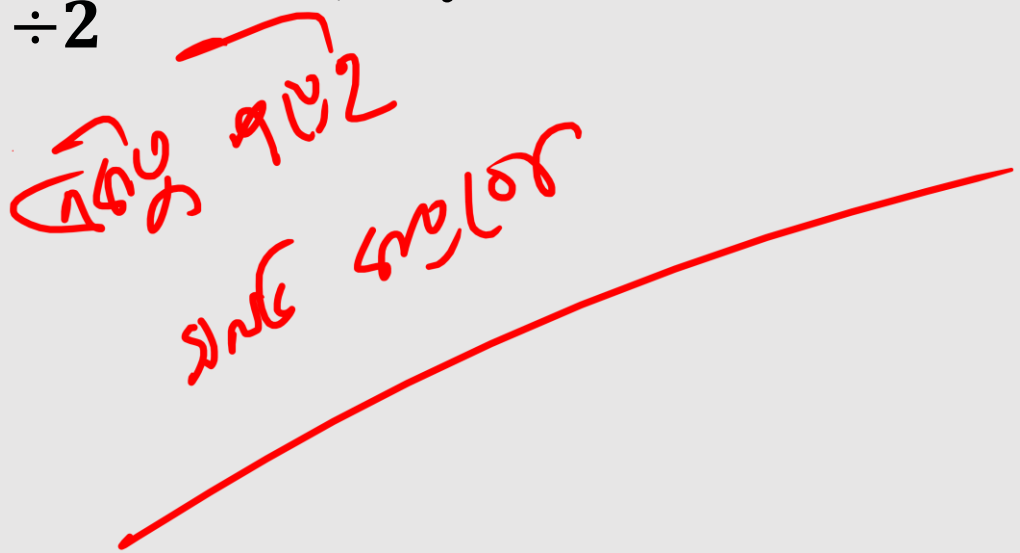
$9^x + 9^x + 9^x$

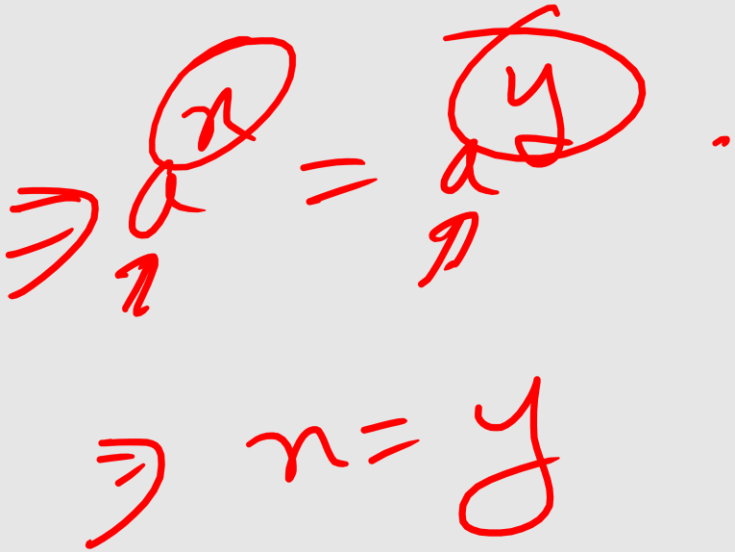
$= 9^x (1 + 1 + 1)$

$= 9^x \cdot 3$

$4^x + 4^x + 4^x + 4^x$ = কত?

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





Type-2

সূচকের সমাধান

$x^3 = 64$ হলে $x = ?$

$4 \times 4 \times 4 = 64$

$x^3 = 4^3$

$\Rightarrow x = 4$

$S = M^{\frac{A}{B}}$

④ $\sqrt[4]{x} = 0.1$ হলে $x = ?$

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

$x^{\frac{1}{4}} = 0.1$

$\Rightarrow x = (0.1)^4 = 0.1 \times 0.1 \times 0.1 \times 0.1$

$= 0.0001$ Ans.

$2^{x+1} = 32$ হলে, $x = ?$

$2 \times 2 \times 2 \times 2 \times 2 = 32$

$2^{x+1} = 2^5$

$x + 1 = 5$

$x = 5 - 1 = 4$

$a^{-3} = 0.2$ হলে, $a^{12} = ?$

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

$0.2 = \frac{2}{10}$

$\frac{1}{a^3} = \frac{2}{10}$

$a^3 = \frac{10^5}{2}$

$a^3 = 5$

$a^{3\times4} = 5^4$

$a^{12} = 625$

$x^{-3} - 0.001 =$ হলে, $x^2 = ?$

$x^{-3} = 0.001$

H.w

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

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

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

$x - 3 = -x + 5$

$x + x = 5 + 3$

$2x = 8$ $\Rightarrow$ $x = 4$

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

$a^x = b$

$(c^z)^y = b$

$c^{zy} = b$

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

$b^{xyz} = b$

$xyz = 1$

Type-3

সূচকের সরলীকরণ

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

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

$$\sqrt{1} = 1$$

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

$$y^{-1} = \frac{1}{y}$$

$$z^{-1} = \frac{1}{z}$$

$(2a^{-1} + 3b^{-1})^{-1}$ এর মান কত?

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

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

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

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

$$3^{2m-m^2+1-2m+3-m^2}$$

$$3^{1-3}$$

$$= 3^{-2}$$

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

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

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

$m = 0$

$$= \frac{3^{0+1}}{(3^0)^{0-1}} \div \frac{9^{0+1}}{(3^{0-1})^{0+1}}$$

$$= \frac{3}{1} \div \frac{9}{3^{-1}}$$

$3 \div 9 \times 3^1$

$3 \div 27$

$\frac{3}{27} = \frac{1}{9}$

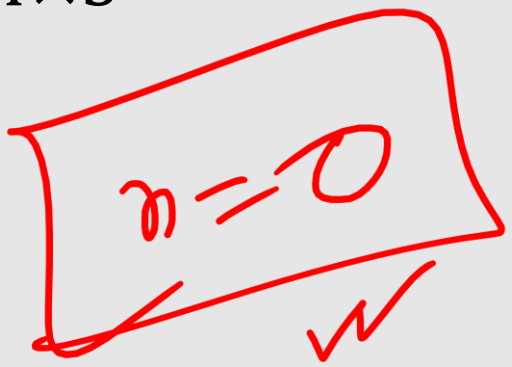
$\frac{3^{x+4}-9\times3^{x+1}}{3^{x+2}}$ এর মান কত?

$x=0$

$\Rightarrow \frac{3^4-9\times3}{3^2} = \frac{81-27}{9}$

$= \frac{54}{9} = 6$

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



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

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

$$= 1$$

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

$$= \left(\frac{x^m}{x^n}\right)^{\frac{1}{mn}} \times \left(\frac{x^n}{x^l}\right)^{\frac{1}{nl}} \times \left(\frac{x^l}{x^m}\right)^{\frac{1}{ml}}$$

$$= \frac{x^{\frac{1}{n}}}{x^{\frac{1}{m}}} \times \frac{x^{\frac{1}{l}}}{x^{\frac{1}{n}}} \times \frac{x^{\frac{1}{m}}}{x^{\frac{1}{l}}} = 1$$

শেষ → আগামীকাল ৫ হবে

Thank you