Math Graduation-3

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জন্মের ইতিহাস

বর্গ সংক্রান্ত সূত্রাবলী

1. $(a+b)^2 = a^2 + 2ab + b^2$
2. $(a-b)^2 = a^2 - 2ab + b^2$
3. $a^2 + b^2 = (a+b)^2 - 2ab = (a-b)^2 + 2ab$
4. $(a+b)^2 = (a-b)^2 + 4ab$
5. $(a-b)^2 = (a+b)^2 - 4ab$
6. $2(a^2 + b^2) = (a+b)^2 + (a-b)^2$

বর্গ সংক্রান্ত সূত্রাবলী

$2(a^2+b^2) = (a+b)^2 + (a-b)^2$

7. $4ab = (a+b)^2 - (a-b)^2$

8. $a^2 - b^2 = (a+b)(a-b)$

9. $(a+b+c)^2 = a^2 + b^2 + c^2 + 2(ab+bc+ca)$

$a^2 - b^2 = (a+b)(a-b)$

$$a^2 + \cancel{2ab} + b^2 = (a+b)^2$$

$$\oplus \quad a^2 - \cancel{2ab} + b^2 = (a-b)^2$$

$$2a^2 + 2b^2 = (a+b)^2 + (a-b)^2$$

$$\therefore 2(a^2+b^2) = (a+b)^2 \oplus (a-b)^2$$

$$a^2+2ab+b^2=(a+b)^2$$

$$-\ a^2-2ab+b^2=+(a-b)^2$$

$$4ab=(a+b)^2-(a-b)^2$$

$$2(a^2+b^2)=(a+b)^2+(a-b)^2$$

$$\therefore a^2+b^2=\frac{1}{2}\{(a+b)^2+(a-b)^2\}$$

$$a^2 + 2ab + b^2 = (a+b)^2$$

$$a^2 + b^2 = (a+b)^2 - 2ab$$

$$a^2 - 2ab + b^2 = (a-b)^2$$

$$a^2 + b^2 = (a-b)^2 + 2ab$$

$+2ab$

$$(a+b)^2 = a^2 - 2ab + b^2 + 4ab$$

$$\boxed{(a+b)^2 = (a-b)^2 + 4ab}$$

পকেটে → 500

পকেটে → $-200 + 700$

$= 500$

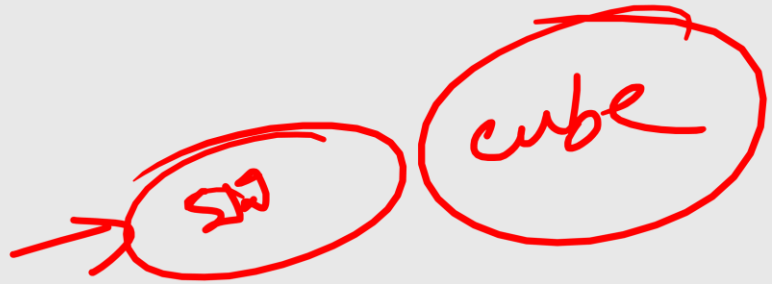
$$(a-b)^2 = a^2+2ab+b^2 - 4ab$$

$$\therefore (a-b)^2 = (a+b)^2 - 4ab$$

$$(a+b)^2 = a^2 + 2ab + b^2$$

$$(a+b+c)^2 = a^2+b^2+c^2 + 2ab + 2bc + 2ac$$

$(a+b)^2$ → square

$(a+b)^3$ → 

ঘন সংক্রান্ত সূত্রাবলী

1. $(a+b)^3 = a^3 + 3a^2b + 3ab^2 + b^3 = a^3 + b^3 + 3ab(a+b)$
2. $a^3 + b^3 = (a+b)^3 - 3ab(a+b)$
3. $(a-b)^3 = a^3 - 3a^2b + 3ab^2 - b^3 = a^3 - b^3 - 3ab(a-b)$
4. $a^3 - b^3 = (a-b)^3 + 3ab(a-b)$
5. $a^3 + b^3 = (a+b)(a^2 - ab + b^2)$
6. $a^3 - b^3 = (a-b)(a^2 + ab + b^2)$

$$(a+b)^2 = a^2+2ab+b^2$$

$$\begin{array}{r} a+b \\ \times\ a+b \\ \hline a^2+2ab+b^2 \end{array}$$

$(a+b)(a+b)(a+b)$

$$\begin{cases} (a+b)^3 = a^3+3a^2b+3ab^2+b^3 \\ (a+b)^3 = a^3+b^3+3ab(a+b) \\ (a+b)^3-3ab(a+b) = a^3+b^3 \end{cases}$$

$3a^2b+3ab^2$

$$(a-b)^3 = a^3 - 3a^2b + 3ab^2 - b^3$$

$$(a-b)^3 = a^3 - b^3 - 3ab(a-b)$$

$$(a-b)^3 + 3ab(a-b) = a^3 - b^3$$

$$a^3 \pm b^3 = (a+b)^3 - 3ab(a+b)$$

$$a^3 - b^3 = (a-b)^3 + 3ab(a-b)$$

$$\begin{cases} a^3 + b^3 = (a+b)(a^2 - ab + b^2) \\ a^3 - b^3 = (a-b)(a^2 + ab + b^2) \end{cases}$$

সূচকের সূত্রাবলী

১. ❖ $a^m \times a^n = a^m . a^n = a^{m+n}$

২. ❖ $\frac{a^m}{a^n} = a^m \div a^n = a^{m-n}$

৩. ❖ $(ab)^n = a^n \times b^n = a^n b^n$

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

সূচকের সূত্রাবলী

৫। ❖ $(a^n)^m = (a^m)^n = a^{mn}$

৬। ❖ $a^{n^m} \neq a^{m^n}$

৭। ❖ $a^0 = 1\ (a \neq 0)$

৮। ❖ $a^{-n} = \frac{1}{a^n}$

৯। ❖ $a^n = \frac{1}{a^{-n}}$

সূচকের সূত্রাবলী

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

11. ❖ $\sqrt{a} = a^{\frac{1}{2}}$

12. ❖ $\sqrt[n]{a} = a^{\frac{1}{n}}$

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

14. ❖ $a^x = b^x$ হলে, $a = b$

15. ❖ $a^x = a^y$ হলে, $x = y$

$2 \times 2 \times 2 = 8$

$2 + 2 + 2 = 6$

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

$a + a + a = 3a$

a^3 → घात / power / सूचक

→ आधार / Base

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

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

$a \times a \times a \times a \times a \times a = a^6$

$b^3 \times b^7 = b^{10}$

$a^2 \times b^5 = a^2 b^5$

$x^7 \times x^8 = x^{15}$

$x^7 \times y^{10} = x^7 y^{10}$

$$\frac{a^4}{a^2} \qquad \frac{\cancel{a} \times \cancel{a} \times a \times a}{\cancel{a} \times \cancel{a}} = a \times a = a^2$$

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

$$= a^2$$

ভাগ → বিয়োগ

গুণ → যোগ

$$(\text{shakib} \times \text{pori})^{7} = (\text{shakib})^{7} \times (\text{pori})^{7}$$

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

$$(2 \times 3)^{2} = 2^{2} \times 3^{2} = 4 \times 9 = 36$$

$(ab)^3 = a^3 b^3$

$\left(\frac{a}{b}\right)^3 = \frac{a^3}{b^3}$

$(ab)^2 = a^2 b^2$

$(a+b)^2 = a^2 + b^2$

$(a-b)^2 = a^2 - b^2$

ಇವು

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

$$(\text{shipa})^3 = \text{shapax shipa x shipa}$$

① $(x^3)^4 = x^{\boxed{12}}$

6 → অসংখ্য ক্ষমতা

৪ → ক্ষমতা

② $a^{2^3} = a^8$

$2^3 = 8$

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

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

$$a^0 = 1$$

$$a \neq 0$$

$$(\ \cdot\ )^0 = 1$$

$$0^0 = \text{ไม่นิยาม}$$

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

$$a^0 = 1$$

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

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

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

$$\begin{cases} a^{x} = b^{x} \rightarrow a = b \\ x^{a} = x^{b} \rightarrow a = b \end{cases}$$

$x \neq 0$, $a, b > 0$

$x \neq 1$

$$
* \begin{cases} 5^0 = 6^0 \rightarrow 5 = 6 \\ 1^5 = 1^6 \rightarrow 5 = 6 \end{cases}
$$

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,** $a^x = b$
- $x^{\log_a y} = y^{\log_a x}$
- $\log_{a^n} b^m = \frac{m}{n} \log_a b$

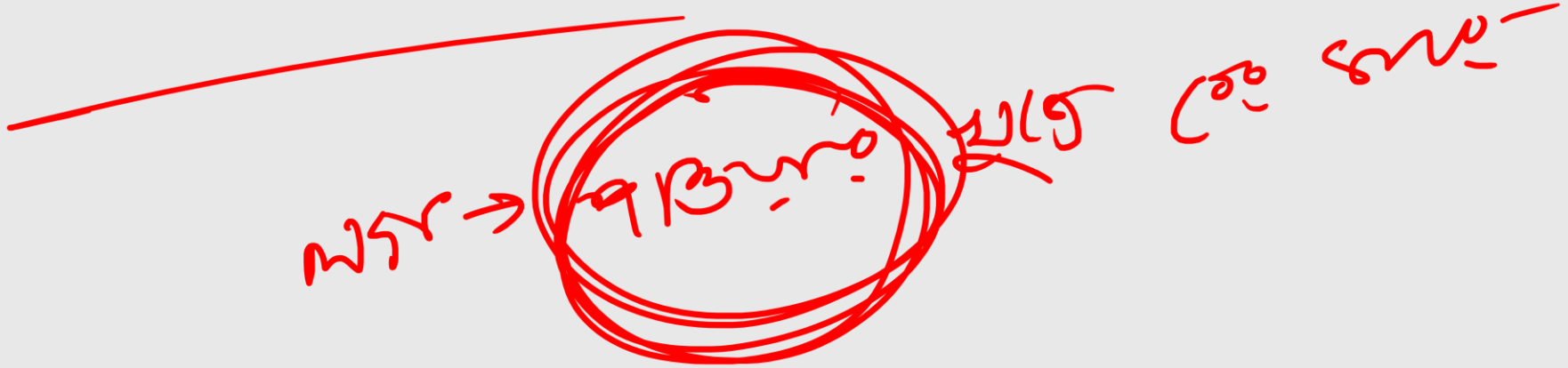
$$2^{3} = 8$$

$2^{\boxed{?}} = 8$; $\square$ কত হলে ? (3)

2 কে ঘাতে কত তুললে মান 8 ; 2 কে → 3

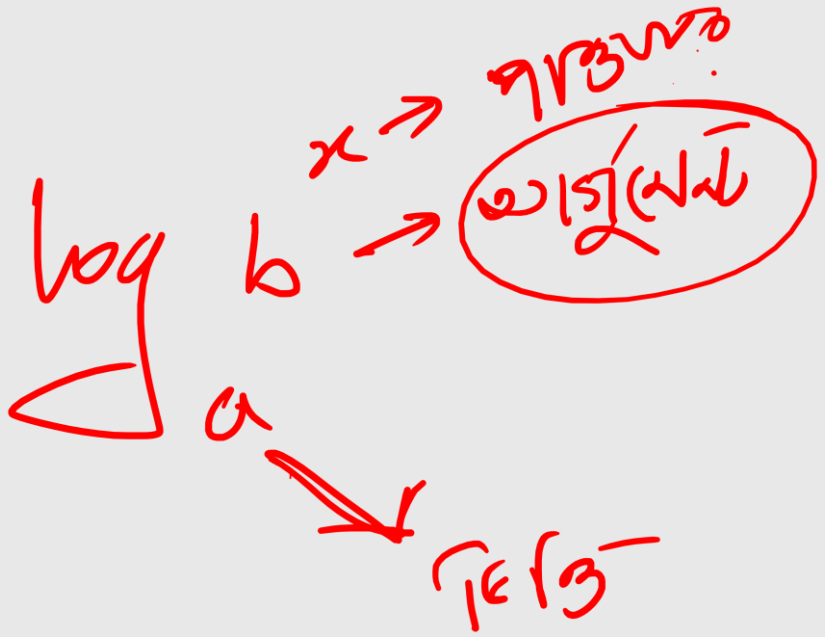
$\longrightarrow \log_2 8$

→ $\log_2 16 = 4$



$$\log_2 1 = 0$$

$$2^0 = 1$$


x
log b
a

$$\log_a^{M \cdot N} = \log_a M + \log_a N$$

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

$\log_a b^3$

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

$= \log_a b^{b \times b \times b} = \log_a b + \log_a b + \log_a b$

$= 3 \log_a b$

$$\log_a b^x = x \log_a b$$

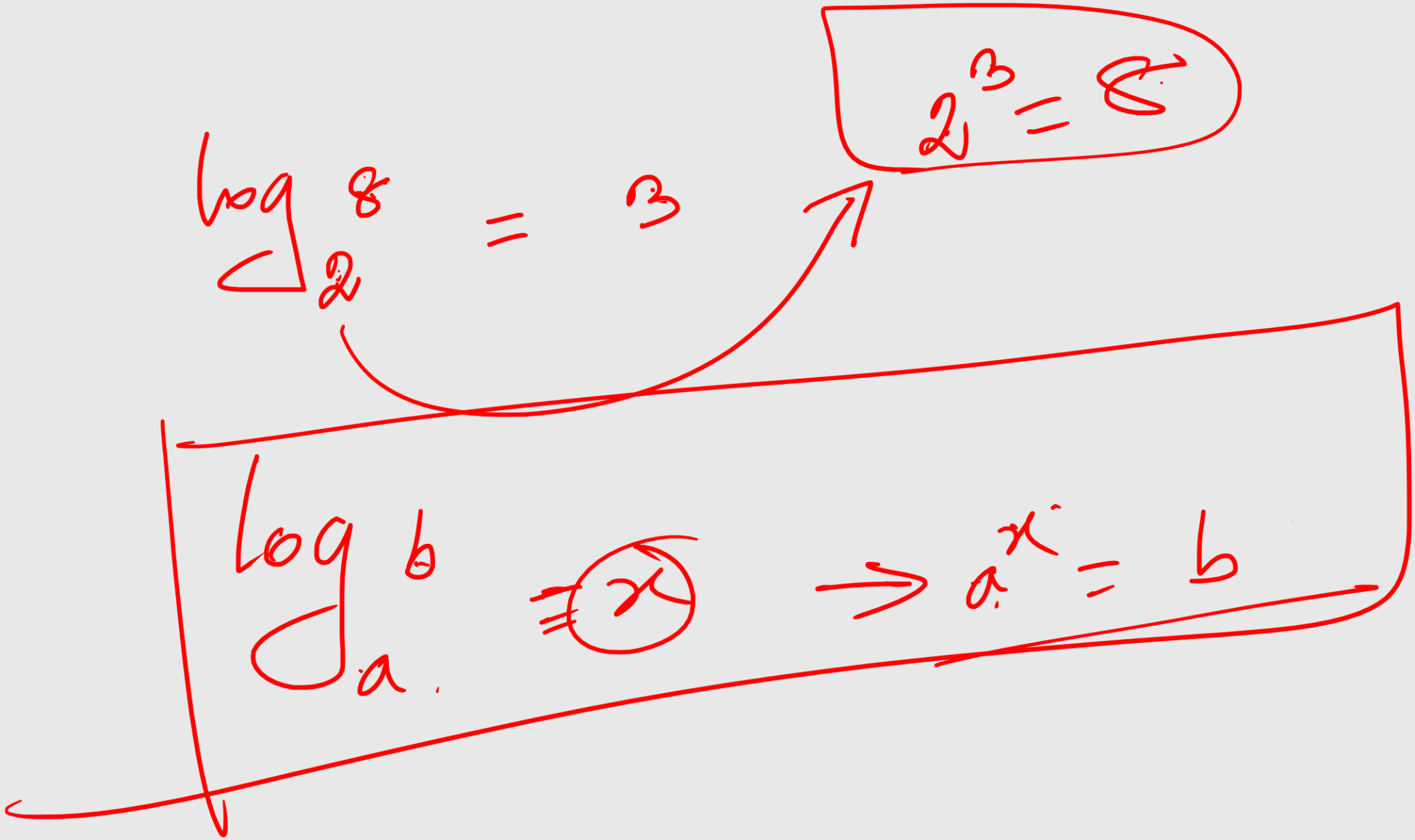
$\log_{\text{অজু}} \text{ম্যাজিক} = \log_{\text{দুলাল}} \text{ম্যাজিক} \times \log_{\text{অজু}} \text{দুলাল}$

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

*

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

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


$2^3 = 8$
$\log_2 8 = 3$
$\log_a b = x \Rightarrow a^x = b$

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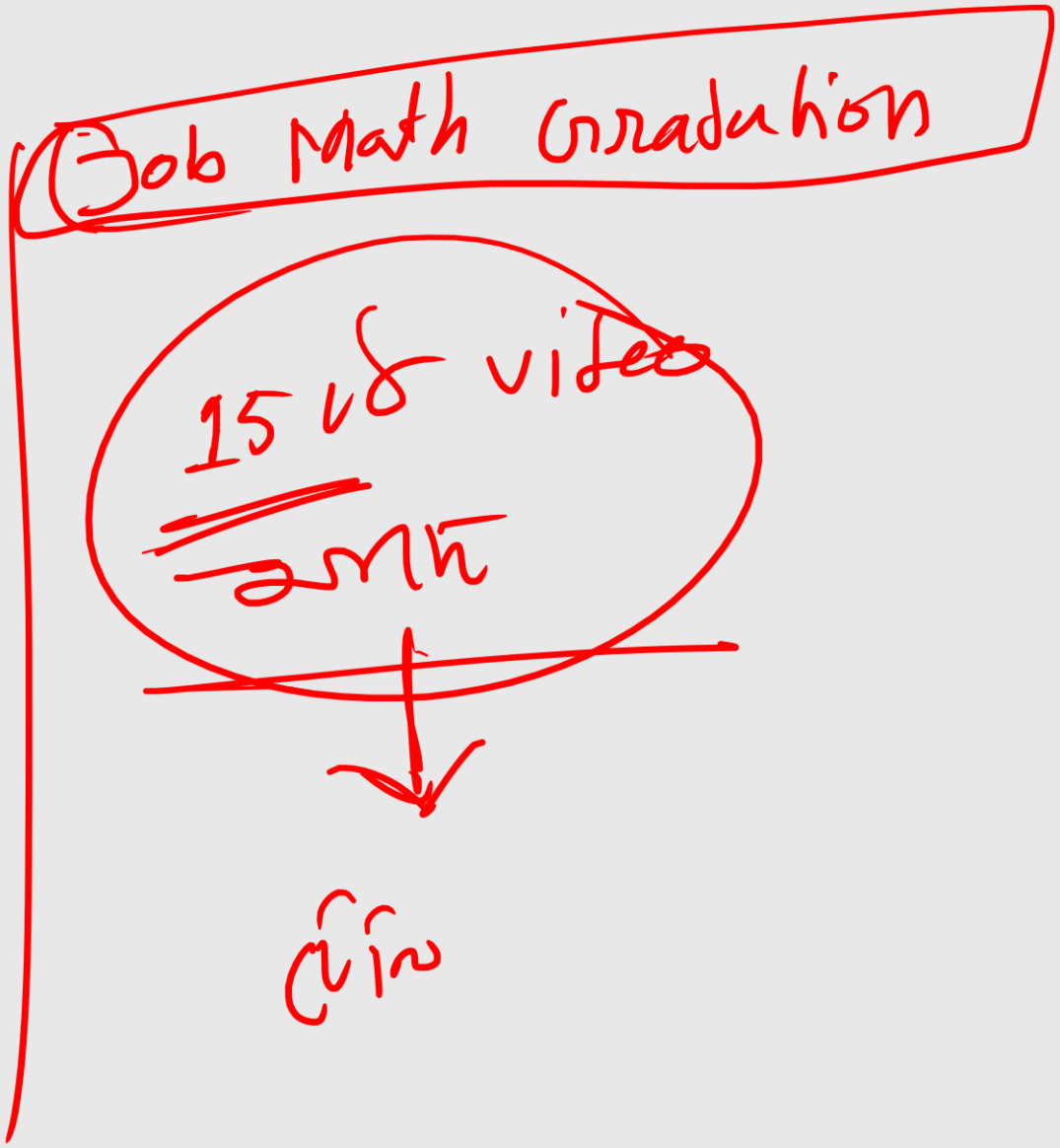

Thank You