DATA SCIENCE

ARTIFICIAL INTELLIGENCE

& also For CS/IT

Permutations and Combinations

Lecture No. 02



Recap of previous lecture









Topic

Permutation & Combination (Part-1)

Topics to be Covered









Topic

PERMUTATION & COMBINATION ">
(Part-2)



Dm't Try to develop Question by your little mind until four have a complete understanding of the Chapter & toy to solve the Dust.

COUNTING PRINCIPLE



fundamental Principle of Addition - If we have do perform only one of the gob at a time out of n jobs then use this principle.

Key words: "Either or, only one, Anyone"

fundamental Principle of Multiplication - If we have to perform all the jobs at a time out of n jobs then use this principle.

Keywords: "AND, Both, All?"

Combination -> (Wen Counting is based on (Selection only) then use this Rule)

$$\left(\sqrt{x} - \frac{x!(x-x)!}{x!(x-x)!} \right) \sqrt{x} \left(\sqrt{x} - \frac{x-x}{x} \right)$$

$$g = \frac{11 \times 10 \times 9}{3 \times 2 \times 1}$$

$$\frac{9}{3} = \frac{7x6}{2x1} + 40 \text{ an}...$$

$$9^{22}C_{19}=?=22$$
 22
 22
 $3+2+1$
 $3+2+1$
 $3+2+1$
 $3+2+1$
 $3+2+1$

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



In a test there are three multiple choice questions having four choices each. Number of sequences in which a student can fail to get all answers correct is

(a) 11

(b) 15

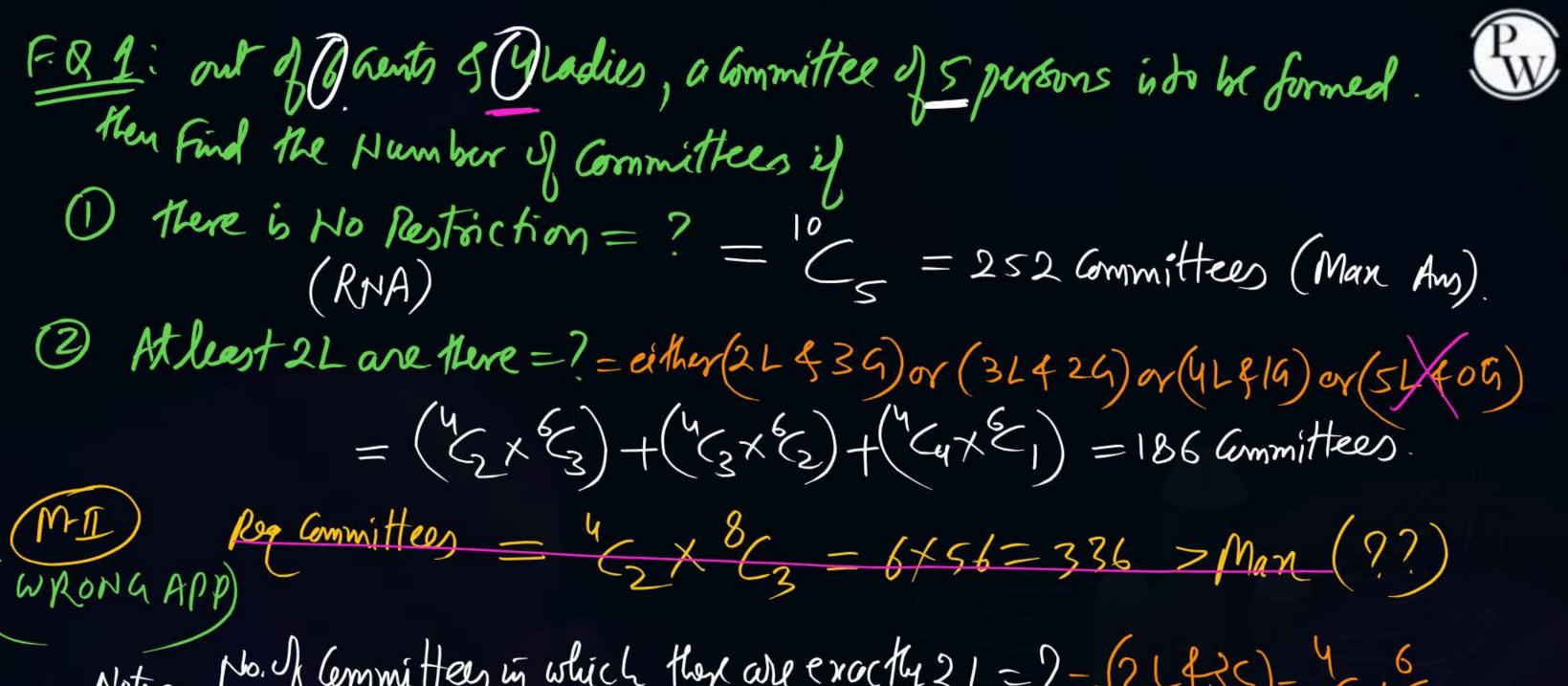
(c) 80

(d) 63

Total possible sequences of Ams = 4way x 4way x 4way = 4=64

(RA)

But it includes one sequence in which student has given all Correct Ans so led way = Total seq - All Correct seq. = 64 - 1 = 63 (d)



Note No. of Committees in which there are exactly 2L=?=(21435)=46x6

(3) At Most 21 are there = ?= (01\$59) or (11\$49) or (21\$39) $= (40 \times 60 \times 60) + (40 \times 60) + (40 \times 60) = 186 \text{ committees}$

- (9) Gents are in Mazority = ? = Same as part (3) = 186
- (3) Ladies " = ? = (4L416) or (3L429) = (4(4x6c) + (4(3x6c)) = 66 committees.
- 6) thre are enactly 31 in that Committee =) = (31429) = 45x6 = 60

1) At least one L is there = ?

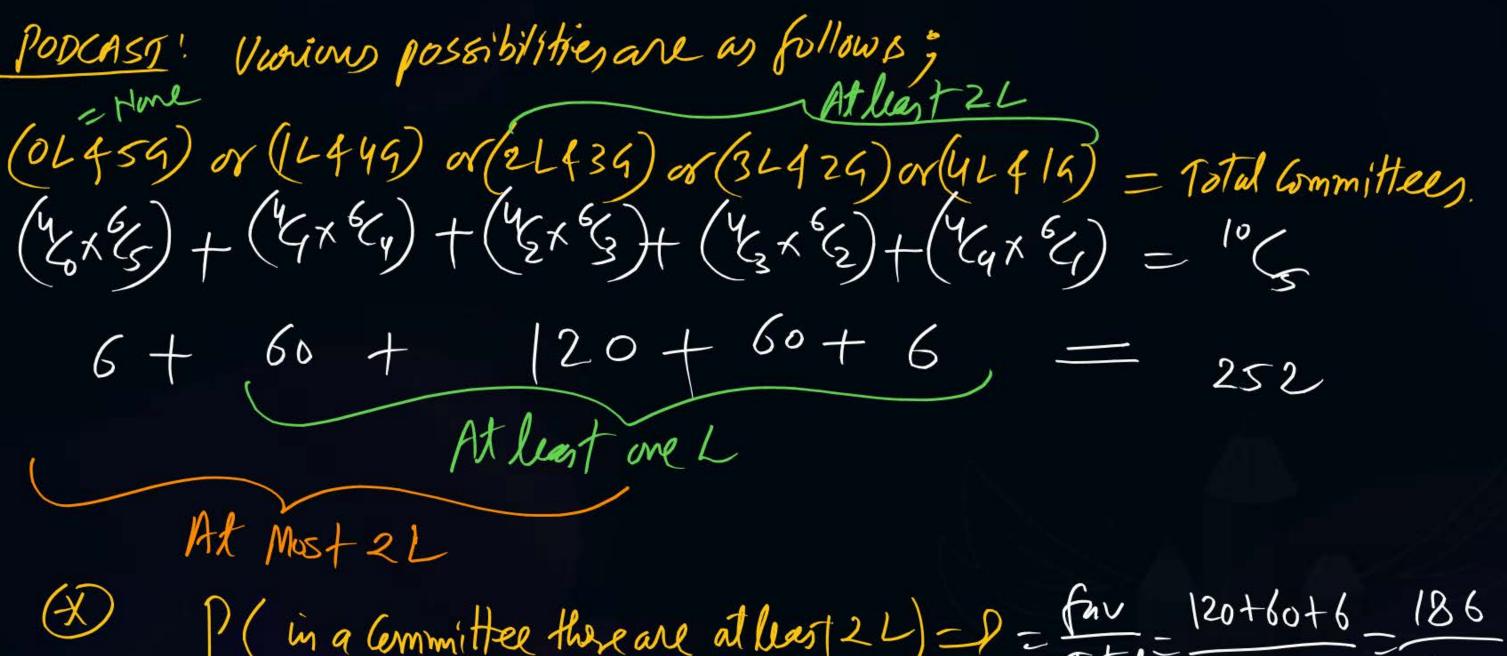


(M.S) Reg ways = (1449) or (21439) or (81426) or (41416) = (464) + (464) + (464) + (464) + (464) + (464) = 246

At least one lady- [Total - None

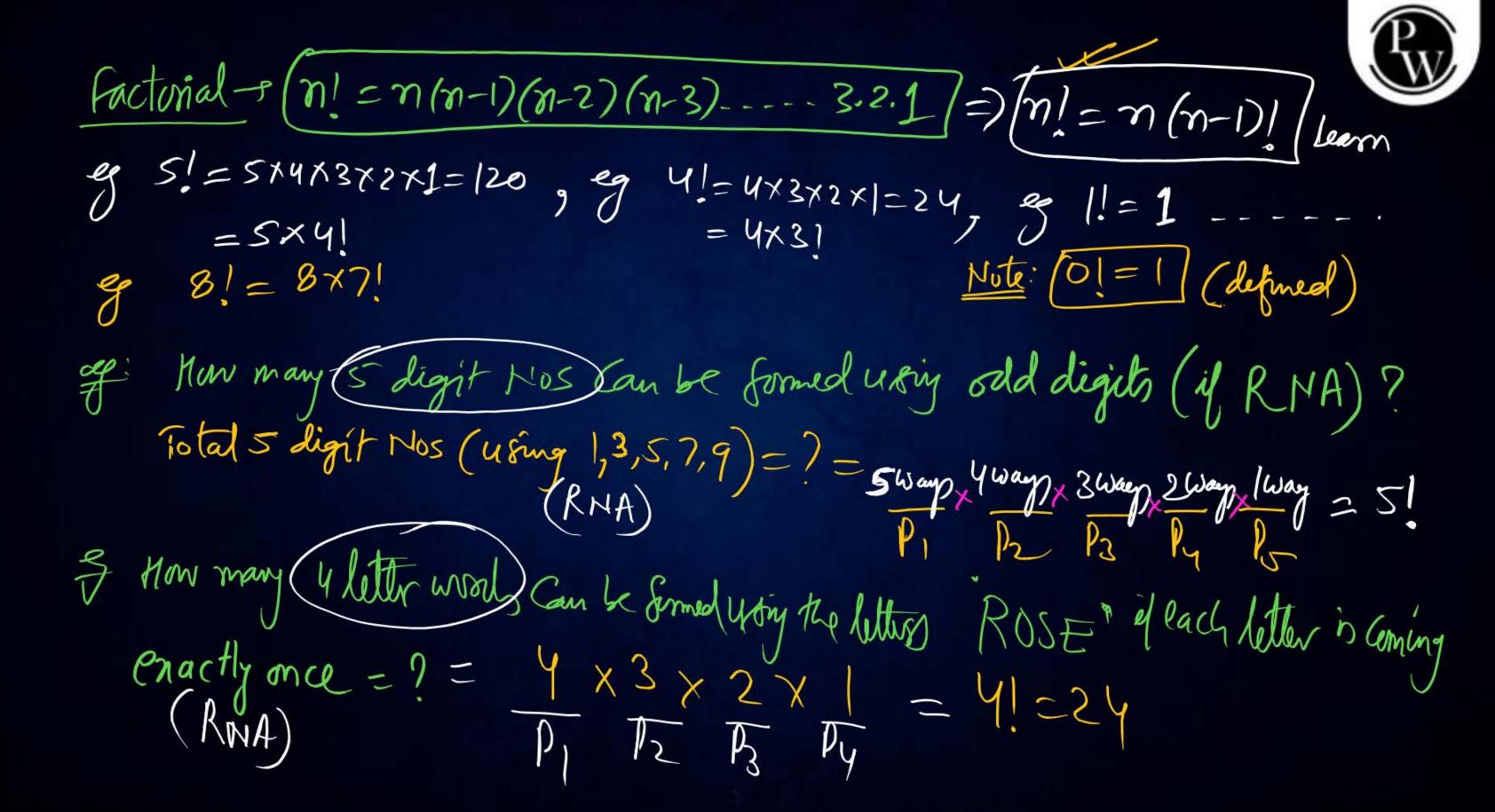
= Total Committees - No lady is there in a Committee = Total - All Gents = 105 - (OL 454) = 252 - 6 - 252-6

= 546



P(in a Committee there are at least
$$2L$$
) = $P = \frac{fav}{Total} = \frac{120+60+6}{252} = \frac{186}{252}$

P(in a Committee there are at least $2L$) = $P = \frac{fav}{Total} = \frac{120+60+6}{252} = \frac{186}{252}$



Analysis of [0] = 1

5!=574737241

2!=24/

11=17

0 = 0 × 1 = 0

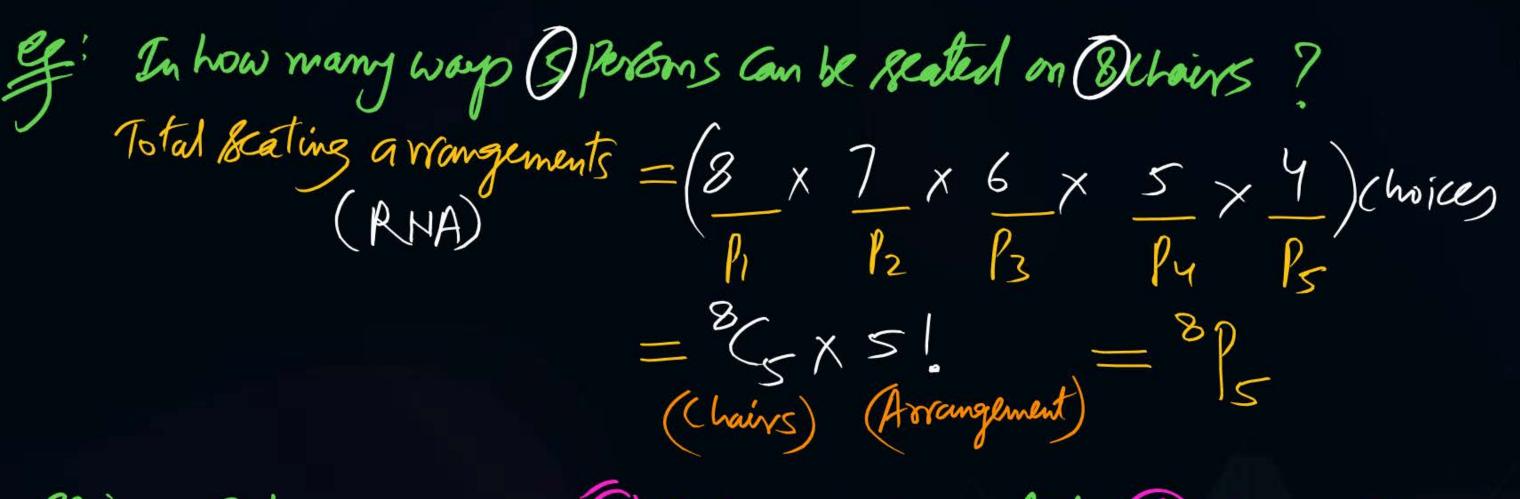
99

il fundamental Depry

12 {MENTOS JIHDAGI} 1! = 1 × 1 = 1 21=241=2 3]=3×2×1= $u! = 4 \times 3 \times 2 \times 1 = 2 \times 1$ 5!= 5x4x3x2x/= /20)

Factorial is Not applicable in Case of 0]





In how many ways (8) Persons can be seated on 8 chairs?

Total scatting arrangements = 8 + 7 × 6 × 5 × 4 × 3 × 2× 1 = 8 × 8 | = 8 |

F. In how many ways 8 Persons can be seated on 5 (hairs ? = function Questions)

Permutation: - (Selection & Arrangement both) _==



If in a Rustin, Counting is Based on, Schection as well as on Assungement

also plan use this Rule.

$$\sum_{n=1}^{\infty} \frac{(n-x)!}{n!} = \sum_{n=1}^{\infty} \frac{(x+x)!}{n!}$$

Galia 12
$$\beta_4 = \frac{12}{2} \frac{2}{4} \frac{1}{4} \frac{1}$$

$$\left(\frac{\eta}{\log 1} - \frac{1}{2}, \frac{\eta}{\log n} - \frac{\eta}{2} - \frac{\eta}{2} \right)$$



Consider three letters a, b, c then Various Combinations=? = 36=1 is only (abc) ie (abc)=(acb)=(bac)=(bca)=(cab)=(cba) Various Brangements = ? MI: = 3x 2x 1 = 6 arrangements PI PZ PZ M-II; = 3! = 6, (M-II) = 36x3!=6 g (abc), (acb), (b(g), (bac), (cab), (cba)

Et of Combination; - formation of team + 1, & Committee -> Hoy Handshakes. - No of Statues 4 08 -> No. of 119ms

Et of Merm : TI in a Ruestien there is a feeling of (interchanging) things then USE no - + formation of words. -) " of Humbers. -> seating arrangement. - Formations of Photographs

11 of toignals.

GAZAB ICA Conclusion -

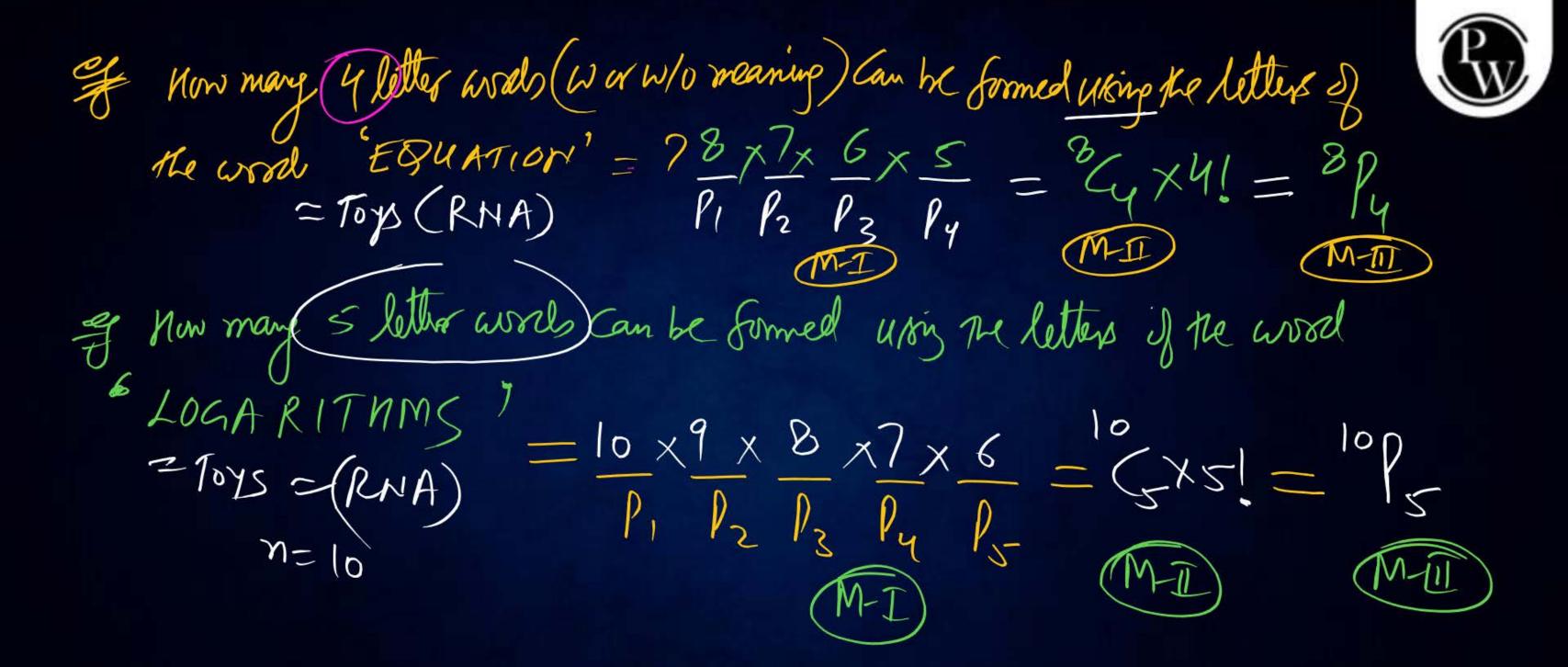


0 4 nor & RNA, Ken Multi Rule = Perm. Rule

34(n=0) & RNA, Then Milt Rule = from Rule = Factorial Rule

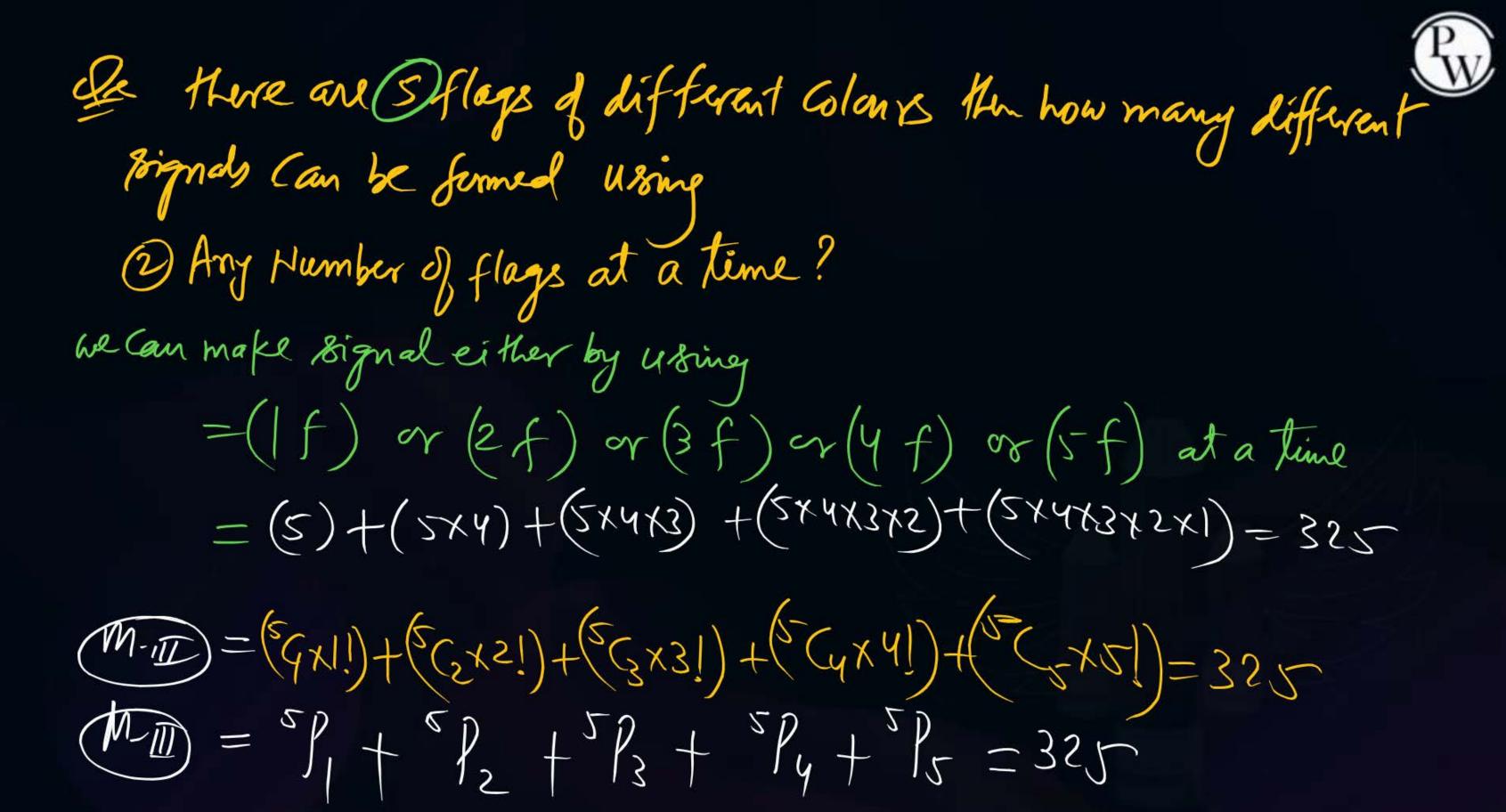
(3) if RA, Man only use Multi Rule.

ie the Concept of nG, nP, & 8! is applicable only when RNA



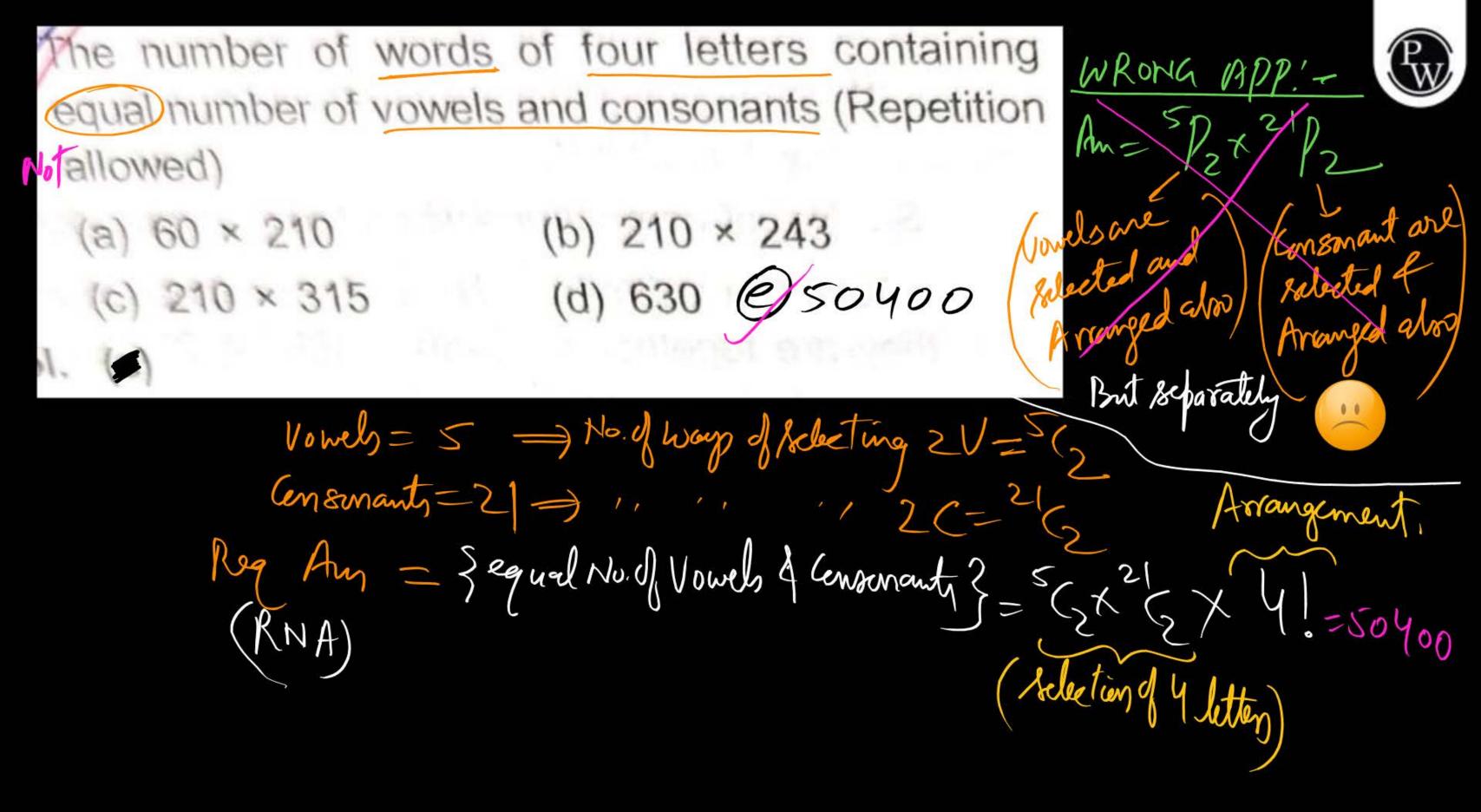
(5) Persons entered in a lift at hound floor in an & sloor House then in how many ways they can leave the lift? O At any floor = $\frac{1}{2} = \frac{7 \times 7 \times 7 \times 7 \times 7}{11 \cdot 12} \times \frac{7}{13} \times \frac{7}{15} = \frac{5}{15}$ ways $\frac{5}{5}$ Person = 5 y floor =) (2) At different flows = ?= 7 x 6 x 5 x 4 x 3 (RNA) P1 P2 P3 P4 P5 = 7 (5 x 5] = 7 P5 (3) P (they all will leave the lift at different floors) =) = fav = 15

 $(RNA) = 5 way \times 4 way \times 3 way = 5(3 \times 31 = 5)$



(3) Using at least 3 f at a time=?= $^{5}P_{3} + ^{5}P_{4} + ^{5}P_{5} = 300$ (4)

11 at Most 2 flags at a time=?= $^{5}P_{1} + ^{5}P_{2} = 25$







if we want to distribute 5 Mphe among Kids (Where distribution is Totally Based on our choice) then various possibilities are as follows;

(OA) or (IA) or (2A) or (2A) or (3A) or (4A) or (5A) = Total possibilities At least 3 App.

At Most 2 App.

At Most 1App.

At least 2 App.

Atleast 1 App.



Let
$$X = Srood$$
 Apples distributed } then (Armost) (Ar least)

(I) $(X \le 1) + (X > 2) = Total Possibilities$

(2) $(X \le 2) + (X > 3) = 19$

Whether we should include or enclude None? in At Most, it totally depends on the Nature of Duestion.

Three dices are thrown joinultaneously then find the possible number of outcomes in which at least one dice show digit "! Total outcomes = 6 outcomes x 6 outcomes x 6 outcomes = 216 outcomes (RA)

D1 D2 D3 No of outcomes in which No Die show digit $4' = 5 \times 5 \times 5 = 125$ outlines & No. of outcomes in which At least one die show digit 'y'

= Total outcomes - No die show digit y = 516-152= 91



MII) No. D'aut Comes in Which at least one die show digit 'y'

[PODCASI]

= (exactly one die is showing 'y') — 3/25=75 (ases) (enactly 2 dice are showing 4) - + 3/2 × 1×1×5=3×5=15 Cares (All 3 dice are showing y') - o 3(3×1×1×1 = 1 Case Total = 75+15+1 = 91 Calles.

Le How many three digit Hosare there such that at least one of the digit is 7? (digits are 0,1,2,3,4,5,6,7,8,9) (PA) Total 3 digit Nos = $\frac{9 \times 10 \times 10}{P_1} = \frac{900}{P_2} = \frac{900}{P_3}$ Nos Total 3 digit-Nos in which 7 is not coming even once = 8 x 9 x 9 = 648 Nos

(RA)

(None)

(None) At least one of the digit is 7 = [Total - None] = 900-64B= 252 Nos. MIII) By Making Cases - P (HW)

