PER COM LEVEL 3

Thursday, August 31, 2023 5:33 PM

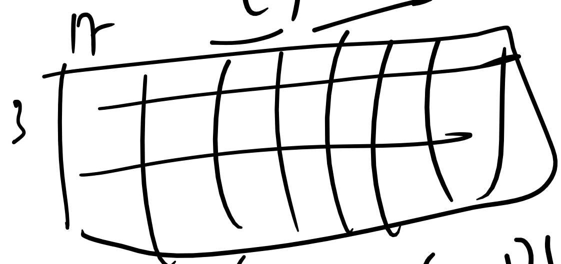
~~9062395123~~

Permutation & Combinations

① In a 17 × 3 Rectangle how many Sq, Rect

$a = 17$
$b = 3$

R



Sq → $17\cdot 3 + 16\cdot 2 + 15\cdot 1 + \cancel{14\cdot 0}$ $ab + (a-1)(b-1) + (a-2)(b-2) + \dots$ till ~~a/b~~ a or b becomes 0

$+ 13(-1)$

Maths
Question ...

85 Indian Democratic Alliance (IDA) is a coalition of three distinct regional parties. IDA decides to contest on 100 seats for the upcoming parliamentary elections. IDA wants to share these seats in such a way that no any ally gets the same number of seats to contest and no two allies contest for the same seat. Also each of the allies must get at least 1 seat to contest. Find the number of ways of allocating the number of seats for the three constituents of the IDA?

(a) 4704 (b) 4851 (c) 4884 (d) 3667

86 Bill Gates personally announced that he would be building 49 toilets in 3 select Indian villages *A*, *B* and *C*, as part of the pilot project. In how many ways these toilets can be built in 3 villages such that village *A* gets more toilets than that of village *B* and village *B* gets more toilets than that of village *C*?

(a) 98 (b) 196

(c) 188 (d) none of these

90 Find the total number of non-negative integers less than 1000 for which the sum of the digits is 10.

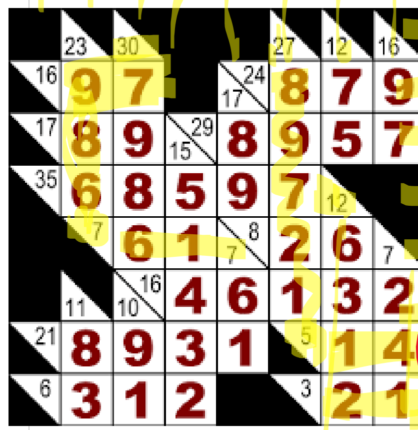
(a) 63 (b) 66 (c) 67 (d) 56

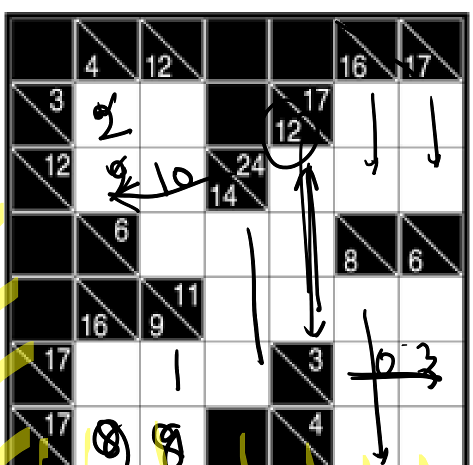
Directions (for Q. Nos. 91 and 92) : *Hirabhai after marrying Hiraben settled in Hiranandini, Mumbai. He has 15 diamond rings and 5 daughters. Among his 5 daughters, he has only one daughter who is not twins.*

$462 = 2 \times 3 \times 7 \times 11$ $\quad 4^4 = 256$

93 Find the number of positive integral solutions of the equation $x_1 x_2 x_3 x_4 = 462$

(a) 128 (b) 1024 (c) 256 (d) 64





Kakuro

Japanese

$x_1 + x_2 + x_3 + x_4 = 462$

94 Find the number of integral solutions of the equation $x_1 x_2 x_3 x_4 = 462$

(a) 2048 (b) 256 (c) 24 (d) 1024

$x_i \to$ are prime. then ...

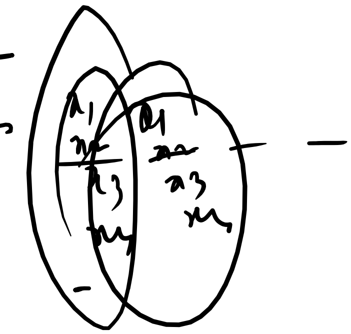
$2 \times 3 \times 7 \times 11 = 462$

$x_1\ x_2\ x_3\ x_4$

Each can be assigned in 4 ways

4^4

2	462
3	231
7	77
	11



Soln is ≥ 0 when 0 or 2 or 4 are negative

$^4C_0 + {}^4C_2 + {}^4C_4 = 1+6+1 = 8$

$8 \times 4^4 = 2^3 \cdot 2^8 \Rightarrow 2^{11}$

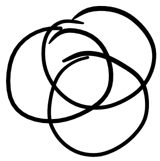
$\Rightarrow 8 \times 4^4 = 2048$

104 Each employee in our office at Lamamia must wear a shirt, a tie and a pair of pants to dress up oneself. Thus, any employee in our office can wear exactly 105 distinct combinations with the help of different colours. No two employees have equal number of quantities of all the three things individually. That is no two employees have x shirts, y ties and z pairs of pants. No two employees have the same colours of their clothes. Maximum how many employees are there in our office?

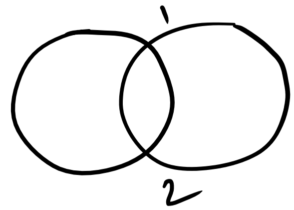
(a) 24 (b) 27 (c) 35 (d) 105

The key The Door

~~$2 \times {}^6C_2$~~



In case of non-overlap (2)

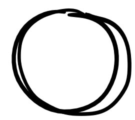


1 Maximum number of points of intersection of 6 circles, is

(a) 30 ✓ (b) 28

(c) 15 (d) none of these

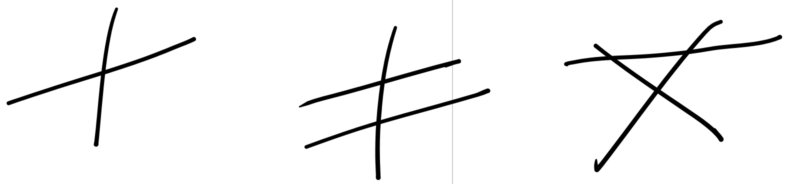
$^6P_2$



$\Rightarrow$ 30

$^{16}P_2$

Level 3

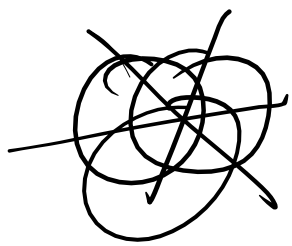


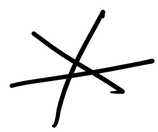
$^6C_2 = 15$

2 Maximum number of points of intersection of 6 straight lines is :

(a) 30 (b) 15

(c) 28 (d) none of these





3 Maximum number of points into which 3 circles and 3 lines intersect is :

(a) 21 (b) 9 (c) 27 (d) 3!

$^3C_2 = 3$

$^3P_2 = 6$

$3 \times 6 = 18$

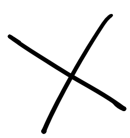
$3 \times 3 + 18 = 27$

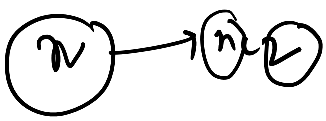
(i) separate circle

(ii) separate to line

(iii) common

Add all ..





4 Eight identical coins are arranged in a row. The total number of ways in which the number of heads is equal to the number of tails, is :

(a) 35 (b) 15 (c) 140 (d) 70

→ (C)

$\frac{8!}{4!\,4!} = 70$

4 Heads
4 Tails

BANANA → $\frac{6!}{3!\,2!\,1!}$

H T H T
H T H T

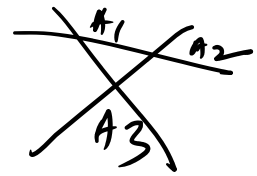
$\frac{8!}{4!\,4!}$

5 Two straight lines intersect at a point O. Points $A_1, A_2, A_3, A_4, A_5, \ldots, A_m$ are taken on one line and points $B_1, B_2, B_3, \ldots, B_n$ on the other. If the point O is not included, the number of triangles that can be drawn using these points as vertices, is :

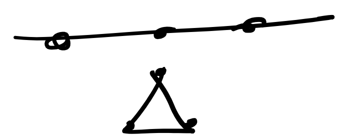
(a) ${}^{n}C_2 + {}^{m}C_2$ (b) ${}^{2n}C_2$

(c) ${}^{m+n}C_2$ (d) none of these

Total $(m+n)$



${}^{m+n}C_3 - {}^{m}C_3 - {}^{n}C_3$



to

6 How many different nine digit numbers can be formed from the number 22 33 55 888 by rearranging its digits so that the odd digits occupy even positions?

(a) 60 (b) 75

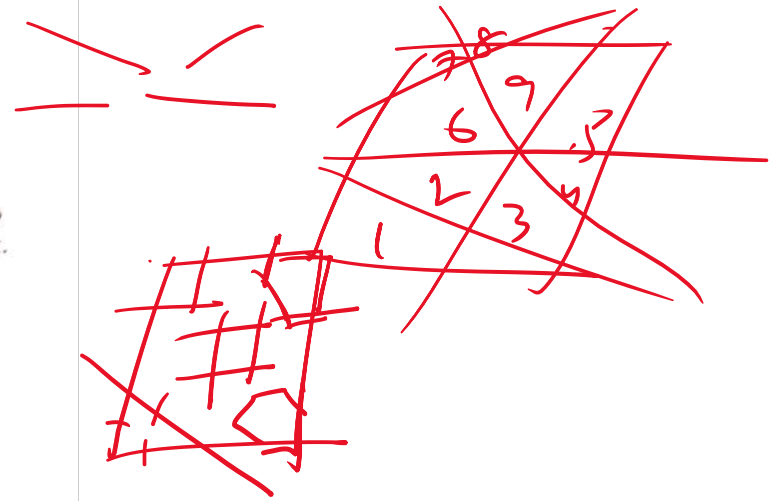
(c) 88 (d) 77

9. Eight straight lines are drawn in the plane such that no two lines are parallel and no three lines are concurrent. The number of parts into which these lines divide the plane, is :

(a) 73 (b) 37 (c) 17 (d) 72

$^nC_0 + {^nC_1} + {^nC_2}$

$= {^8C_0} + {^8C_1} + {^8C_2}$



10 Number of divisors of the form $4n + 2 (n \geq 0)$ of the integer 240 is :

(a) 6 (b) 4 (c) 3 (d) 12

11 The number of rectangles excluding squares from a rectangle of size of 12×8 is :

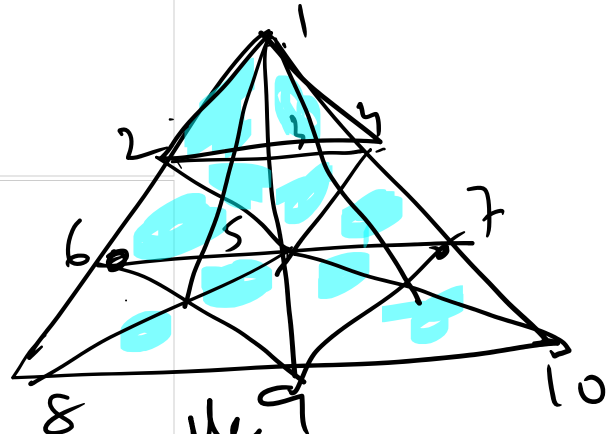
(a) 1234 (b) 625

(c) 2460 (d) 256

12 Two lines intersect at O. Points $A_1, A_2, \ldots, A_n$ are taken on one of them and $B_1, B_2, \ldots, B_n$ on the other the number of triangles that can be drawn with the help of these $(2n+1)$ points is :

(a) n (b) n^2 (c) n^3 (d) n^4

(a) n (b) n^2 (c) n^3 (d) n^4



13 The number of ways in which 9 identical balls can be placed in three identical boxes is :

(a) 12 (b) 6 (c) 9 (d) $\frac{9!}{3!}$

= 12 ways

14 The number of ways in which 30 coins of one rupee each be given to six persons so that none of them receives less than 4 rupees is :

(a) 246 (b) 462

(c) $\frac{30!}{6!}$ (d) none of these

18 The number of permutations of the letters of the word LUMINARY such that neither the pattern LURY nor MINA occurs is :

(a) 46800 (b) 24600

(c) 40086 (d) none of these

19 10 students are to be seated in two rows equally for the MOCK CAT in a room. There are two sets of papers, code *A* and code *B*. Each of the two rows can have only one set of paper but different that from the other row. In how many ways these students can be arranged?

(a) 2775600 (b) 1200560
(c) 125600 (d) 7257600

20 Aman Verma and Mini Mathur jointly host a TV programme in which one particular day n guests attend their show. In that show, each guest shakes hands with every other guest and each guest shakes hands with each of the hosts. If there happens to be total 65 handshakes, find the number of guests who attend the show.

(a) 13 (b) 14

(c) 10 (d) 9

3×10 = 30 marks → [illegible]

3 marks to each 10

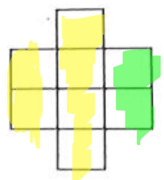
Remaining 20 → 10 → $^{20+10-1}C_{10-1}$

⇒ $^{29}C_9$

21 The number of ways in which an examiner can assign 50 marks to 10 questions giving not less than 3 marks to any question is :

(a) $^{29}C_9$
(b) $^{47}C_3$
(c) $^{52}C_2$
(d) $^{40}C_{10}$

25 Six *Ps* have to be placed in the squares of the diagram given below such that each column contains at least one *P*. In how many ways this can be done?



(a) 26 (b) 13
(c) 8 (d) 24